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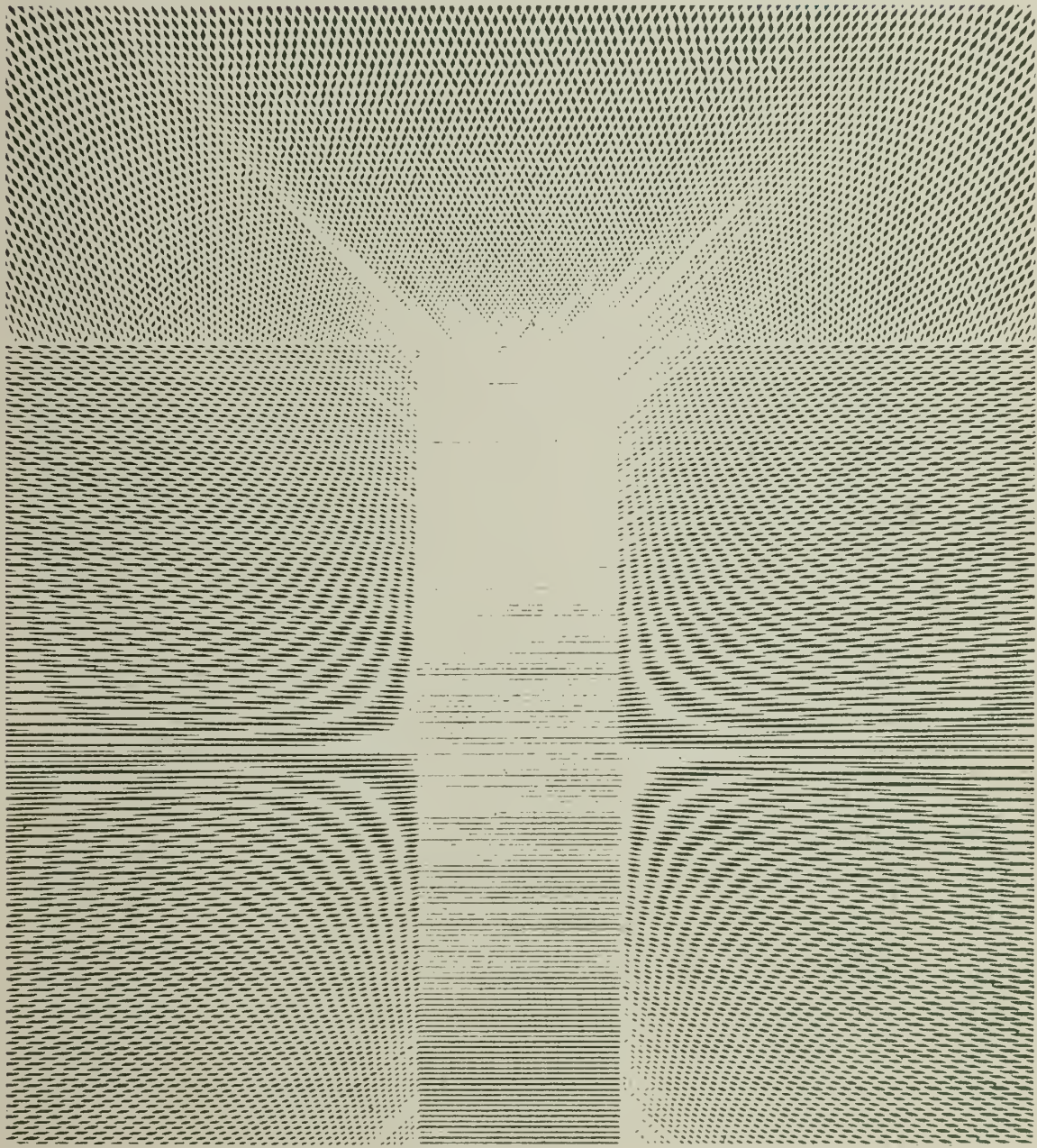
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Prehistoric Resources of East-Central New England:

A Preliminary Predictive Study

National Park Service
U.S. Department
of the Interior
Washington 1976



Cultural Resource Mangement Studies


Prehistoric Resources of East-Central New England:

A Preliminary Predictive Study

**Dena F. Dincauze
Judith W. Meyer**

**National Park Service
U.S. Department of the Interior
Washington**

1977



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Foreword

This report evaluating the prehistoric archeological resource base of east-central New England is the first to be published from a series of studies funded by the Executive Order 11593 technical assistance program of the Interagency Archeological Services Division, Office of Archeology and Historic Preservation. Large scale cultural resource management is a relatively unevolved activity in the United States. For this reason, a series of pilot studies has been conducted for the purpose of developing methods and gaining practical experience in the application of resource management techniques and procedures. Although the results of these studies are being used in-house as aids toward the revision of the approach being taken to organization of comprehensive statewide plans for historic preservation, it is clear that these studies contain important data and conclusions worthy of consideration by Federal, State and local agencies that plan projects and develop comprehensive regional plans for their own activities.

Prehistoric resources in the region covered by this study have historically received less attention than have later, European-associated, archeological sites. This is indeed unfortunate and Dincauze and Meyer have shed important light on the nature of the severe resource losses that are occurring throughout the region with no significant attempts being made to plan ahead to avoid losses or to mitigate when losses must occur. In consequence of this, it is our hope that their report will stimulate awareness and concern for the prehistoric archeology of eastern New England by the public and private sector.

Finally, it should be clearly understood that this report was intended to gauge the resource base in terms of existing data. We be-

lieve that it has generally been successful in utilizing an environmental framework for evaluating the significance of prehistoric resources in this area. It has also pointed out the limitations of existing data for describing the resource base. Further, it sets forth the essential steps for acquiring data necessary to prepare a reliable prediction of archeologically sensitive geographic areas in eastern New England. This report was not intended to provide data of the type needed for environmental impact assessments of specific locations within the study area, and Federal, State or local agencies should not attempt to use the report for this purpose. Nor is the report intended for use as an authoritative general planning document. As the authors clearly indicate, the projections of prehistoric site distributions are not based on consistent, systematically gathered data but simply on the available information which has been collected casually and coincidentally during past years. Accordingly, we cannot yet have confidence in the representativeness of the data base or in the reliability of the projections derived from it. It also must be recognized that this report does not address historic archeological site distributions at all.

It is our chief expectation that this report will stimulate activity for the development of approaches to the historic preservation planning process appropriate to this and to other landscape settings.

Rex L. Wilson

**Department Consulting Archeologist and Chief,
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This publication was planned to demonstrate the significance of the long-ignored New England resource—archaeological sites. The report is intended to make accessible to land-use planners and administrators some basic data about the distribution, density, and scientific value of prehistoric sites in the region.

The report appears at this time in response to a changing climate of opinion and of official concern for prehistoric remains, as reflected in recent federal legislation and guidelines which define new conservation policies at the state and national levels. The new requirements must be met with an informed awareness of the significance of prehistoric sites, and with sensitivity to their special characteristics.

New England, blessed with a wealth of historic monuments, has long ignored its prehistory—the cultural and historical record of the native, non-European peoples. The few enthusiasts who have always shown some interest in archaeological remains have never been numerous or influential enough to save even the most obvious ones from thoughtless destruction. Now, the anticipated further expansion of Megalopolis along the coasts threatens to obliterate whatever still remains to inform us of more than eleven thousand years of human experience in the region. If we are ever to know more than we do now about this unique human record, rapid compliance with federal standards for resource management must occur in all six states.

Objectives

In the modern climate of concern for environmental and historical resources, conservationists and land-use planners at all levels of government and in the private sector find their

interests converging. It is hoped that this manual will be helpful to land-use planners and policy makers, historic preservationists and legislators in federal, state, and municipal governments, as well as to citizen groups interested in protecting and preserving the natural and cultural values in the land. Archaeological sites are simultaneously parts of natural landscapes and historical resources. They cannot be adequately understood as either natural or historical phenomena alone. They are part of the continuing story of man's relationship with his environment, and as such, their appeal is as broad as their significance.

This publication is the first attempt to produce a manual of its particular scope and purpose—a summary and evaluation of the archaeological resources of a major urban region, incorporating an examination of the status and efficacy of historic preservation planning in behalf of those resources. The region considered is the heavily developed and urbanized area of east-central New England between Boston, Massachusetts, and Portland, Maine.

In the chapters that follow, we have tried to present the material in ways which will be directly meaningful and useful for the audience to whom the report is directed. The summary of archaeological resources is presented in terms of overall spatial distribution and densities, distribution among soil classes defined for their development potential, and gross landscape classes. We include a discussion of the significance of these cultural resources and make a first, quite inadequate, estimate of their destruction in the past. Contemporary forces of destruction are summarized, and future impacts of projected urban growth are indicated and evaluated. The inadequacy of cur-

rent knowledge about site locations, and about the history of human experience in the region, will be evident. Much remains to be learned from this rapidly diminishing data base.

Federal and state legislation and programs for cultural resource management are described. Measured against the scale and urgency of the need, the state programs especially are seen to be seriously defective. More could be done, even with existing legislation, than is in fact being done, and much more is needed if the region is not to be permanently deprived of its rich heritage from prehistoric times. Some recommendations for improvement of the programs, both long-term and short-term, are offered.

Applications

It is anticipated that this report will serve many useful purposes, as diverse as the roles its readers play in resource planning and policy implementation. It offers a status report on the existing archaeological resource base. It can indicate to planners, policy makers, and legislators some potential effects, good and bad, of their plans on that resource base. It summarizes present policies, describing their benefits and defects, and it indicates ways in which those policies must, and can, be improved in the interest of resource conservation.

Because archaeological sites are still poorly understood as natural and cultural resources, it is necessary to be explicit about some potential misapplications of this report. First, the call for archaeological conservation is not another device to impede or obstruct legitimate development of land. It is rather an effort to reduce the long-term social and cultural costs of such development by protecting and conserving an irreplaceable endangered resource of great value. Second, the summaries of archaeological site densities presented here cannot be used as a source of data for environmental impact studies for individual projects, or as substitutes for impact studies, since they are neither explicit enough nor based upon information of sufficient quality to satisfy the requirements for impact studies. Third, the maps and tables presented here are not definitive, or even adequate, measures of the region's

prehistoric cultural resources, and thus cannot serve as cultural inventories for the areas covered. In appropriate places throughout the text, especially in Chapters Three and Six, this point is elaborated in order to impress upon users of this manual the fact that quantifications presented are in almost all cases minimal statements. The density summaries on tables and maps, with their culturally irrelevant erratic variations, stand only as indicators of the critical need for on-ground surveys in advance of landscape modifications. They are meant as early-warning signals, not guideposts, and cannot substitute for detailed reconnaissance. Their only legitimate use is as a base from which to expand our knowledge.

Conclusion

Presently, no New England state offers meaningful protection to any of its prehistoric cultural resources. None has established the elementary administrative structure which would enable them effectively to use the protection that exists at the federal level. Moreover, none has created conditions in which resource management policies can be formulated, or the data gathered on which such policies must be based.

Human occupation of New England began more than 10,000 years ago, when bands of hunters drifted into the region on the track of Ice Age game—caribou and mastodon. They came into a landscape very different from that of today. They hunted in spruce forests and tundra, and across the exposed continental shelf far to the east of the modern shoreline. Since that time, climate, vegetation, and topography have changed greatly. The melting of the continental glaciers released vast amounts of water into the sea, so that the sea level rose, inundating the continental shelves. The warmer climate permitted the northward spread of deciduous trees, berry bushes, and other nutritious plants of the temperate zone. Moose, and then deer, replace caribou, and large numbers of smaller animals spread and settled into the region. spread of deciduous trees, berry bushes, and other nutritious plants of the temperate zone. Moose, and then deer, replaced caribou, and large numbers of smaller animals spread and settled into the region.

Successive human populations learned to adapt to new conditions, changing their lifestyles in response to new opportunities and new restrictions. The story of human adaptation in New England is of interest not only to the region's current residents, but to students of human behavior everywhere, who use such information in comparative studies, seeking to learn about regularities in human behavior through time and space.

Methods

Knowledge of human life in New England before the sixteenth century A.D. can be recovered only through archaeological methods. Details of the native cultures of the sixteenth

through the eighteenth centuries are inadequately recorded in written archives, and need to be further explored archaeologically. The methods of archaeology have developed toward scientific precision only within the present century; they are now being actively refined and expanded, so that techniques for researching the human past are improving constantly. The methods and techniques employed by archaeologists require access to many kinds of raw data, and demand ever greater precision in their applications. Archaeologists collaborate with geologists, zoologists, botanists, soils scientists, oceanographers, ecologists, physicists, chemists, and statisticians in addition to the social scientists who are their closest academic colleagues.

All of the specialized methods of measuring and segmenting time, reconstructing ancient landscapes, mapping long-buried community plans, and describing ancient subsistence and ceremonial activities eventually provide the archaeologist with the information he is seeking—reconstructions of past human lifestyles and understanding the development of cultures through time.

The native cultures and culture history of New England are being explored and studied by archaeologists using these special techniques. The task is a slow one under the best conditions, but in New England conditions are rarely optimal. Over three hundred and fifty years of expanding population and intensive land development has resulted in heavy destruction of ancient sites in the region and the pace of such destruction is accelerating. Archaeologists must make the best of the data that remain to them, and try to learn enough from extant sites to establish a basis for extrapolating about the destroyed ones. The brief

summary presented here is based upon research conducted throughout eastern New England since 1865; most of the data have been gathered since 1950 by a small corps of professional and volunteer archaeologists.

The Hunters and Gatherers

Living sites of the early caribou hunters are rarely found in New England, and the few that are known have not been subjected to careful archaeological study. This rarity is a product of at least two different factors—the populations were probably never very large, and in the time which has passed since the sites were occupied geological forces as well as residential and industrial development have, no doubt, effaced many of them. The largest site of the early hunters known in New England was found within the survey area on a high terrace above Bull Brook in Ipswich. There, a great many of the characteristic stone tools of these early inhabitants have been found in clusters indicating family camp sites grouped together on the high terrace. The location may have been chosen for the overlook it provided onto the low plains to the east and north of the site, so that the hunters could remain comfortably around their campfires while keeping an eye out for the movement of the caribou herds below. Other sites are known in the area, but none has been explored in any detail. Stray finds of the characteristic early hunter artifacts have been made in Maine, New Hampshire, and Middlesex and Essex counties in Massachusetts.

The end of the caribou hunter period was defined by the climatic changes which drove the caribou slowly north. Ultimately, the caribou hunters had to move also, or learn new habits of hunting and new ways of life. We still do not know whether the descendants of the caribou hunters stayed and made adjustments or whether they left and reoccupation of New England occurred again from the south.

After 7000 B.C., there are indications that peoples whose culture was related to others farther south and west had come into New England where they were perhaps hunting moose and elk in the early deciduous forest of that time. Known sites of the next millennium are

all very small, none has been carefully excavated in any detail, and very little is known about the adaptive patterns, group size, or ultimate fate of the people who lived there. Our only record of their passage is a few stone tools scattered over the landscape. We would like to learn more about them. These sites, like the older ones, will be small and fragile, because even as late as eight thousand years ago, the landscape in New England differed from that of today.

We know a lot more about the people who lived here after about 6000 B.C. By that time, the people who lived in southern New England had relatives all along the Atlantic seaboard south as far as Florida. Similar artifacts of similar ages are found throughout this area. The New England population was showing strong adaptation to the seasonal changes of available resources. Near Manchester, New Hampshire, they had a large spring fishing camp where they gathered during the spring runs of salmon, shad, and alewives. In the Shawsheen River Basin of Essex and Middlesex counties in Massachusetts, and the Cochato valley southwest of Boston, many small sites of the same age occur. These may have been winter sites located along the sheltered margins of inland ponds, where ice fishing would provide food through the winter. Some of the sites are situated along extensive marsh and swamp lands which may have been somewhat wetter, boggy meadows at the time. These would have been good places to intercept the spring and fall bird migrations and obtain an abundance of meat and feathers. The seasonal adaptations which we see established by this time produced a large variety of sites; no two duplicate one another, each has something new to tell us about the way these people were utilizing the ancient New England environment. We know nothing about the occupations of this age in southern Maine, but we know from scattered artifacts and sites as far north as Labrador that Maine was inhabited at this time.

By 3000 B.C. New England enjoyed a climate warmer than that of today, and the forest cover in the southern part was more like that of the Chesapeake Bay now. In these rich forests human populations expanded to a density similar to that existing when the English settled the

area 4600 years later. By this time, New England inhabitants had become adept at exploiting the new resources of their habitat. Under the city of Boston, 20 feet below modern tide level, was found an ancient fish weir, constructed to intercept the spring runs of alewives, shad, and perhaps salmon. The construction of the weir required large amounts of labor expended over a short period of time each spring, when the weir had to be renewed from the ravages of winter storms. This indicates that the people, by this time, had very extensive knowledge of the seasonal resources and a large repertory of means for exploiting them. They were capable of cooperating in major tasks and probably lived together in fairly large numbers whenever the food supply was adequate in a particular place. They had, by this time, scattered over the entire landscape of southern New England. Sites may be found almost anywhere within that area, not only in the fertile floodplains of the rivers or along the seacoast, but upland into the hills near springs and ponds. Wherever food was available for any animal, human populations by this time had learned to exploit it. The diversity of lifestyles implied among the many sites is not understood, and needs to be examined in detail.

The relatively high population density of this period, between 3000 and 1000 B.C., produced conditions in which the social skills of the inhabitants became very important. From within the survey area, we have some interesting evidence of fairly elaborate burial rites. Sites showing such ritualism have been recognized in southern New Hampshire and widely in eastern Massachusetts. Along the Sudbury river in Wayland a very large cemetery, the limits of which cannot be known because it's destruction, produced evidence for repetitive ritualism involving fairly large numbers of people, perhaps seasonally, in ceremonies which were somehow related to notions of afterlife and provision for the soul's journey. The ceremonies also reinforced the sense of community among the surviving members of the social group. New England populations by this time had learned enough about the natural environment to have begun to express preference for certain kinds of raw materials and to establish means whereby they could maintain

supplies of these goods, even from very long distances. We suspect, in other words, the existence at this time of long-distance trade on a fairly regular basis.

Around 1000 B.C., a series of environmental and cultural changes transformed lifestyles in southern New England. The climate became a little cooler, and eventually, through the centuries, the forest composition changed toward that familiar to the early English settlers. Sea levels began to stabilize and estuaries began to form. Along the East Coast, the great clam beds of modern times developed. The Indians did not neglect this enlarged resource. The seashore had long been a dependable source of nutritious food for New England residents but about this time people began to rely more heavily upon coastal resources and to accumulate large shellheaps which were landmarks along the coast before modern destruction. The shellheaps which remain between Casco Bay and Boston Harbor are among our potentially most informative prehistoric remains, because the chemical conditions in shellheaps permit the preservation of objects of bone, antler, and shell, which are usually lost in the region's acid soil. There have been few systematic explorations of these shellheaps of east-central New England. We do not know when they began to accumulate, whether there was a time lag between Boston Harbor and southern Maine, what the seasons were of maximum exploitation of the clamflats, and what the activities were in these middens other than shellfish gathering and consumption.

Within the last millennium B.C. the old adaptive patterns of southern New England changed. Fewer people lived in the hilly interiors; they gathered at the shore more often, and perhaps for longer periods of time. The old trade routes broke down, and for a time people seemed to live in more parochial communities than they had before, with fewer outside contacts and more regional individuality than had been characteristic in the earlier millennia. In these same centuries, the craft of pottery-making was introduced into New England, apparently from the west—across the Hudson river. The economic and social importance of this change in cooking vessels is not known. For about a thousand years before,

people had been simmering their stews in bowls made of soft rock, "soapstone" or "steatite." Enormous quantities of this rock were quarried in Worcester County and other areas of central southern New England.

The Farmers

There is a possibility that, about the time of the settlement shift to the coast and the adoption of pottery, New England inhabitants began to experiment with the domestication of food plants. This is merely speculation, however, because we have no hard evidence about the beginning of horticulture or plant domestication in this region. We do know that by 1100 A.D., and therefore presumably beginning sometime before that, New England farmers were growing corn. Probably beans and squash were being raised at the same time. These three families of domestic plants were not native to temperate North America; they had been introduced from the sub-tropical areas of Mexico. Their adoption in New England represented a major native horticultural achievement—the acclimatization of semi-tropical plants to the northern temperate zone.

By the sixteenth and seventeenth centuries A.D., the European explorers and settlers of New England began to write about the life of the native inhabitants. It is clear that horticulture was well established south of the Saco River, and had a tentative foothold between the Saco and Kennebec Rivers. In 1605, Samuel de Champlain reported extensive gardens along the shore of southern Maine, New Hampshire, and eastern Massachusetts, as he sailed south toward Cape Cod. Champlain, and John Smith some nine years later, were impressed not only by the gardens but also by the heavy population density along the coast.

Some communities of the contact period were large villages, others, small seasonal camps. The introduction of domesticated plants did not make sedentary farmers out of the southern New England Indians, who retained some elements of the very old, seasonally shifting, lifestyle. Maps of the area of southeastern New England—eastern Massachusetts and Rhode Island—made in 1634, show several vil-

lages characteristically near the head of tide on major rivers. Archaeologists are familiar with large sites upriver, too, especially along major streams such as the Merrimack, the Concord, and the Sacc. None of these late large sites, or for that matter any of the late small ones, have been adequately explored through excavation. Therefore, we are unable to say very much about the social organization, resource exploitation, or economic development of the southern New England Indians. Our knowledge depends almost entirely upon the reports of French and English explorers who knew these people in the sixteenth and seventeenth centuries. Most of the Europeans had their own reasons for reporting what they did, and for ignoring other aspects of culture which are of extreme interest to anthropologists and the modern inhabitants of New England.

Archaeological remains of the contact period itself are interesting, and full of intriguing puzzles. We know that Spanish and Portuguese fishermen were on the Grand Banks southeast of Newfoundland and possibly as far south as George's Bank southeast of Cape Cod, well before any permanent English or French occupation of the mainland. They surely met and traded with the Indians occasionally. However, they have left us very little in the way of records, and their presence itself could be overlooked except for the discovery of some interesting southwestern European artifacts in some Indian graves of this period.

The Seventeenth Century

The seventeenth century was a period of intense cultural disruption among the New England Indians. The new European trade goods, which the Indians coveted, caused some immediate economic and social changes. The Indians began to press each other for access to the goods and to wage wars with one another. This for the first time approached the European pattern of wars waged for economic gain. The result was that very early in the century native political and economic structures had been radically altered, long before the Europeans themselves were in close enough contact to describe these structures. In 1616 and 1617, a devastating plague raged throughout southern

New England, north at least as far as the Saco River, and south and west to Narragansett Bay. The populations in between were drastically reduced in number, over 90% in some areas. The Indians in the Boston area were almost entirely wiped out. The result was that when the English began to settle in southern New England, after 1620, the area was very lightly populated in contrast to what it had been, and the native lifestyle was in ruin.

The destruction of their own culture made the southeastern New England Indians more willing to accept the new cultural patterns offered by the English missionaries. Thus, it is not surprising that the first communities of Christian converts in New England were established in eastern Massachusetts, where the native populations have felt the brunt of the disrupting new conditions for several decades. Between 1650 and 1674, several villages of Christian "Praying" Indians were established near Boston, with five in the survey area itself: Natick at the present village of South Natick, Ponkapoag within the present boundaries of Canton and Stoughton, Wamesit near Lowell, Nashoba near Littleton, as well as a smaller late village called Okommakamesit near the present town of Marlboro. The Christian Indians were established in villages where they were expected to remain throughout the year and to adopt English styles of husbandry and economic and social structures. They were able to do this only partially, and even from village to village the degree of acculturation varied. The largest and most successful villages, at Natick and Ponkapoag, gradually came to look like poor English towns, with their central meeting house and school, and small English-style cottages gradually replacing the native dome-shaped wigwam. The Indians adopted at least the outward forms of English religion, and almost completely adopted Christian English modes of burial. By the end of the seventeenth century, they were burying their dead in pine planked coffins, with head and footstones, rarely engraved, superficially indistinguishable from those of their English neighbors. The experiment in Christianizing Indians and making good Englishmen out of them came to a tragic conclusion with the war of 1675—King Phillip's War. At the end of that eighteen month

struggle, many of the Christian Indians were dead or scattered to the west and north with other refugees. Those who remained were weakened in numbers and health from winter isolation on the islands of Boston Harbor, where they had been interned at the insistence of the frightened English in the eastern towns. The plantations at Natick and Ponkapoag continued in existence for at least another fifty years. People of Indian descent still live in the Ponkapoag area.

Southern New England was not a wilderness when Europeans found it in the seventeenth century A.D. It had been a human habitation for at least eleven thousand years, and had been farmed for centuries, by people who considered it a comfortable and desirable place to live. The story of human life in New England cannot be known without archaeological investigations into those thousands of years of unwritten history.

Survey and Evaluation of Prehistoric Cultural Resources

Sites that record human experience in east-central New England, over a span of eleven thousand or more years, represent highly significant cultural resources. Public interest in prehistory has never been higher, and is likely to grow as archaeological research methods make possible more detailed reconstructions of past lifestyles and more satisfactory explanations of their variety. In order to protect the public heritage, programs of resource management must be defined and implemented to minimize future damage to the remaining archaeological sites.

Characteristics of Prehistoric Resources

Archaeological sites, considered as cultural resources, have four characteristics which must be explicitly recognized in planning a management program. They are 1) finite, 2) unique, 3) systemic, and 4) fragile. Like all historic monuments, archaeological sites are *finite* because, as products of the past, they are non-renewable resources. The resource base, once created, cannot be expanded in the future. Archaeological sites, again like historic monuments, are *unique* because each records events which occurred at a specific time and place, distinct from events at all other times and places. In addition, archaeological sites have a special quality of uniqueness in that they can only be studied destructively—once excavated, an archaeological site or portion thereof has no further data resources to offer.

The *systemic* character of archaeological sites derives from their origin as the localized traces of human behavior, which is related to conditions and events in other times and places. No site can be understood in isolation from its natural surroundings, from the activities of its

inhabitants at other sites, or from the activities of the local predecessors of its inhabitants. Archaeological research increasingly involves the coordinated efforts of many natural scientists working with the archaeologist at a site, to reconstruct the environments of the past and to document human interactions with them. In return for their interpretation of a site's ecology, they may acquire, information directly relevant to their own research. By their very nature, archaeological sites are time capsules, preserving traces of past biotic communities, climate, landforms, sea levels, and other elements of human ecology which may be of immediate interest to other scientific disciplines.

And, finally, archaeological sites are *fragile* because their significance derives not only from their contents, parts of which are almost indestructible, but from the spatial patterning of the contents. Archaeologists do not excavate primarily to retrieve objects, but to observe the relationship among objects in their original position, and between objects and other, more ephemeral traces of human activities. For this reason, a site excavated without records is destroyed just as surely as a site bulldozed, even if quantities of objects are collected intact.

Present Knowledge of the Resource Base

The data presented on Maps 1 through 10 and Tables 1 through 4 were obtained from publications and archives in Maine, Massachusetts, and New Hampshire. No field investigations were made to check current conditions against old records, nor was any effort made to supplement existing records in areas known to be underreported. Some of the records were made as long ago as 1873, others, as

recently as 1972. The sites were found and reported for the most part by amateur archaeologists and natural historians, people with an eye for landscape and an interest in prehistoric man. The records are necessarily very uneven in scope, accuracy, and age.

The data gathered from these disparate sources were summarized on maps and on edge-punch cards, from which the tables and maps of this report were prepared. The intention was to provide an overview of present knowledge about the prehistoric resources of the survey region. Calculations expressed to two decimal places cannot substitute for accuracy of data, and nothing we have done to the data during processing has improved its quality at all. This summary is, therefore, a mere beginning toward the knowledge necessary for a professional evaluation of prehistoric sites of east-central New England.

The density figures expressed on the maps and tables are calculated by counties (Table 1), drainages (Table 2), and U.S. Geological Survey topographic quadrangles, 7.5 minute series (Maps 1-3). They are expressed as if the known sites are evenly distributed throughout those spatial units. Prehistoric peoples, like modern ones, chose their living and working places with an eye for both comfort and convenience. Living sites tend to cluster close to sources of food and water, and to travel routes. Sites for utilizing the natural environment such as stone quarries and clam flats had to be near the resource. Thus, some places have a great many archaeological sites close together, even piled on top of one another, and other places have few or none. Understanding the reasons for the locations of prehistoric sites is one of the major tasks of the archaeologist, which may require a considerable body of detailed data from the sites and their surroundings.

Maps 1, 2, and 3, and Tables 1 and 2 display what is presently known about prehistoric site densities in the survey region. The variations in density from area to area represent nothing more significant than the intensity of site reporting in different places. The relatively greater activity of professional and avocational archaeologists in Massachusetts is immediately apparent, as well as the spatial restrictions of intensive research with that state.

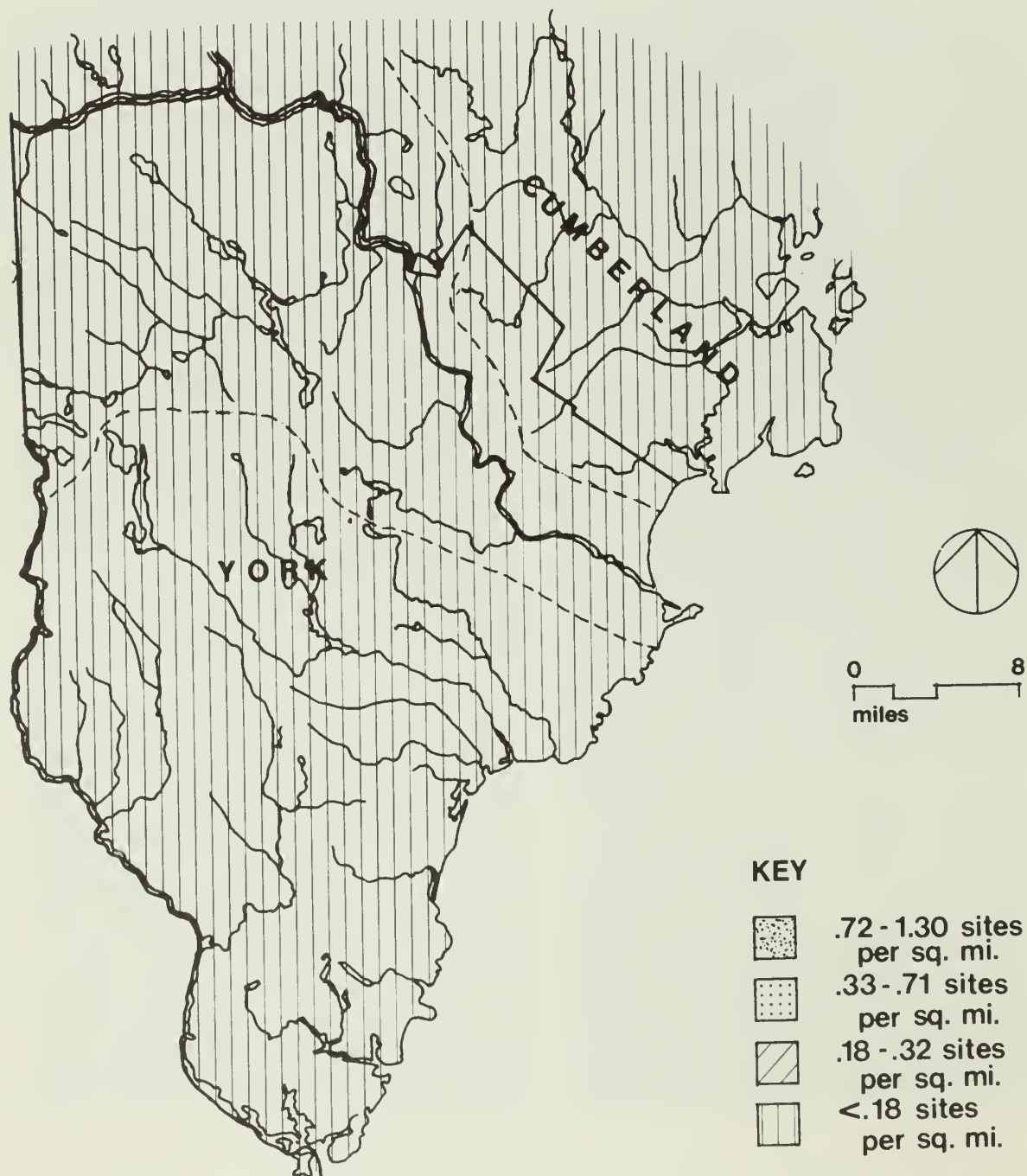
The density figures represent neither actual nor modern site densities anywhere; the highest figures (.33 through 1.30 sites per square mile) are both minimal records of real site density and exaggerated representations of present conditions. The lowest densities shown on the maps are inadequate and depressed resource statements for past conditions and probably for the present as well.

Estimates of survey adequacy cannot confidently be made from data so poorly controlled as these are. In an attempt to say something useful about the present state of knowledge, habitat comparisons have been attempted on Maps 4 through 6. Four classes of high-density habitats were defined on the basis of current knowledge of site distributions; they are designated A-D on the maps. All known high-density habitats are related to water courses and water bodies. The maps compare known densities in relatively well-surveyed locales to equivalent habitats where sites are poorly reported. The known high densities should be considered minimal reasonable expectations for similar habitats within the survey region. Thus, the Piscataqua-Great Bay estuary in New Hampshire should have a site density close to that of Ipswich, Massachusetts, shore (.72-1.30); its present low density (less than .18) is a statement from ignorance. Examples of other paired habitats occur on all three maps.

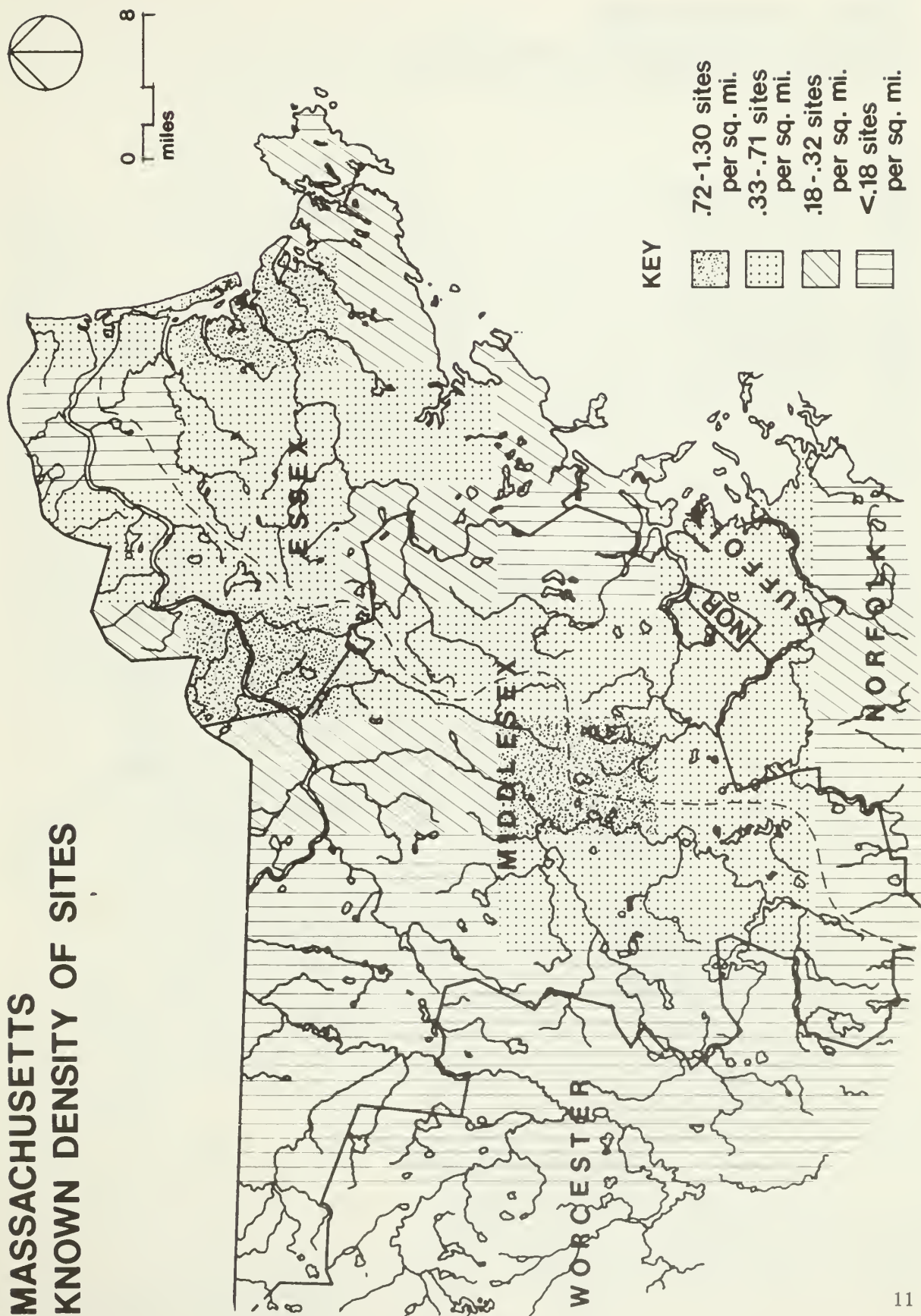
Estimates of Destruction to Date

Within the survey region, site loss has been serious everywhere, and extreme in the many urban areas. Moreover, the losses have not affected the resource base evenly; rather, certain kinds of sites have been destroyed more often than others. Both natural and cultural forces have contributed to the selective destruction of the site population. Post-glacial sea level rise along the coast in the survey region has submerged or eroded most littoral and estuarine sites older than 4000 years. The erosion continues today along the coast; very few coastal sites are intact. Therefore, we will be able to learn proportionately less about ancient uses of tidewater habitats, because the sites are underwater or destroyed. The older inland

1
MAINE
KNOWN DENSITY OF SITES



MASSACHUSETTS KNOWN DENSITY OF SITES



NEW HAMPSHIRE KNOWN DENSITY OF SITES

KEY

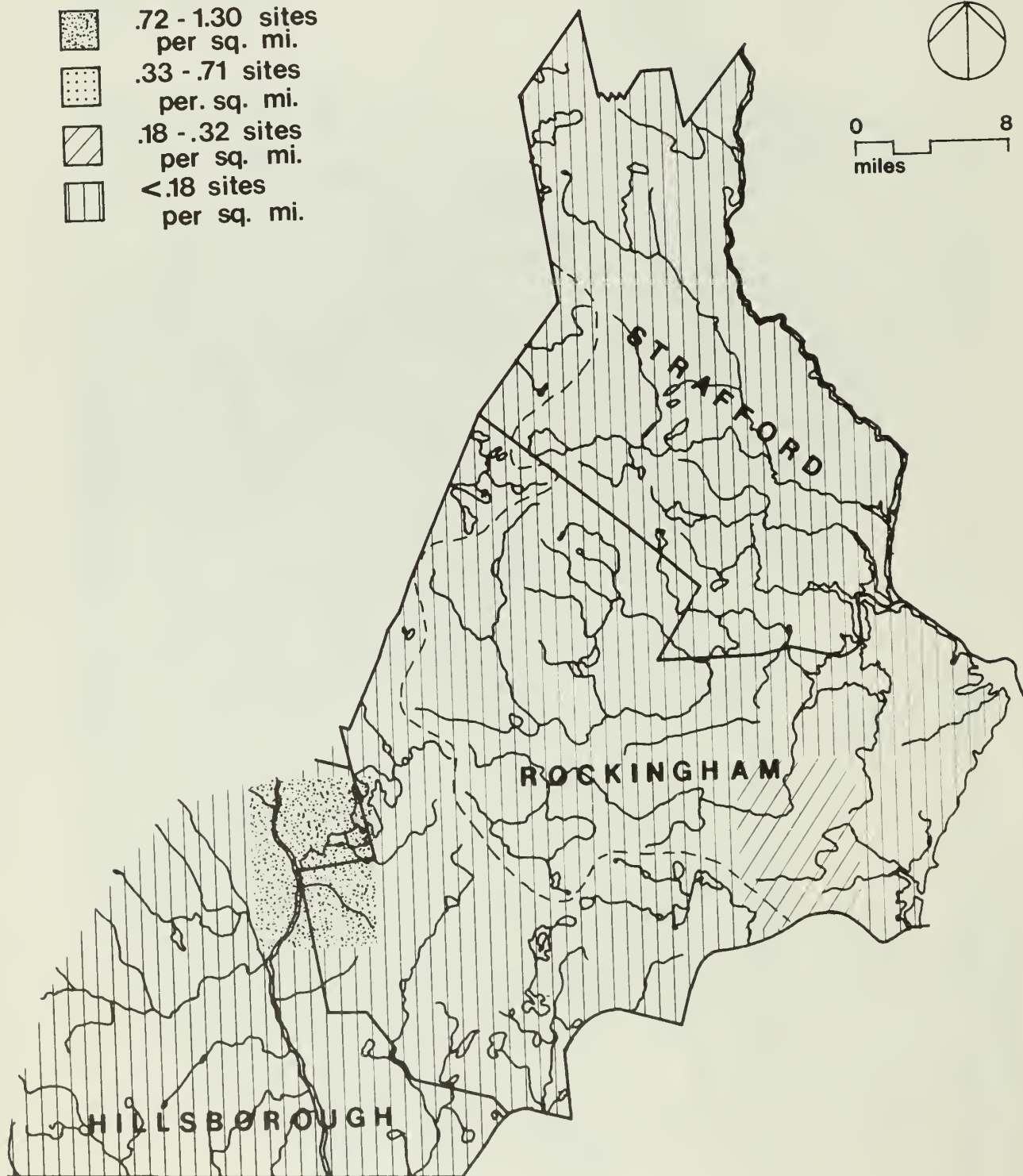
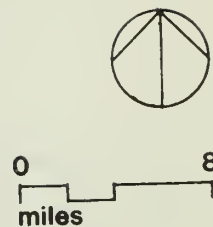
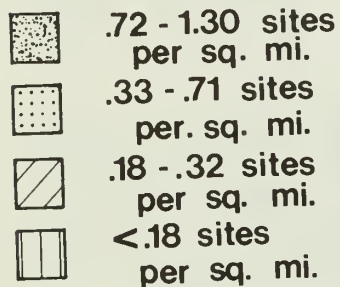


TABLE 1
Recorded Site Densities and Soil Categories by Counties

Counties	Percentage of Sites per Soil Category*											
	Number of Sites Reported	% of County Included	Known Sites per Square Mile***	A	B	C	D	E	F	G	H	X
Maine	24											
Cumberland	5	17	.02	—	20.0	40.0	—	—	—	20.0	20.0	—
York	19	100	.02	15.8	15.8	10.5	5.3	10.5	—	36.8	—	55.3
Massachusetts	638											
Essex	274	100	.55	47.0	10.5	19.7	4.4	9.8	1.0	4.4	2.9	2.5
Middlesex	273	89	.61	75.8	2.6	10.6	2.2	8.8	.4	2.2	—	.7
Norfolk	49	54	.23	75.5	—	22.5	4.0	2.0	2.0	—	—	4.0
Plymouth	10	9	1.67	20.0	—	80.0	—	—	—	—	—	—
Suffolk	26	100	.46	—	—	—	—	—	—	—	—	100**
Worcester	5	11	.03	40.0	20.0	20.0	—	—	—	—	—	20.0
New Hampshire	115											
Hillsborough	64	51	.14	48.4	12.5	3.1	1.5	40.6	—	—	—	—
Rockingham	49	100	.07	36.7	16.3	6.1	4.0	24.5	—	14.3	—	8.1
Strafford	2	44	.01	50.0	50.0	—	—	—	—	—	—	—

*Totals may exceed 100% because some sites are no more than one soil.

**No soil survey for urban Suffolk County

***Unrealistically low, see text for discussion

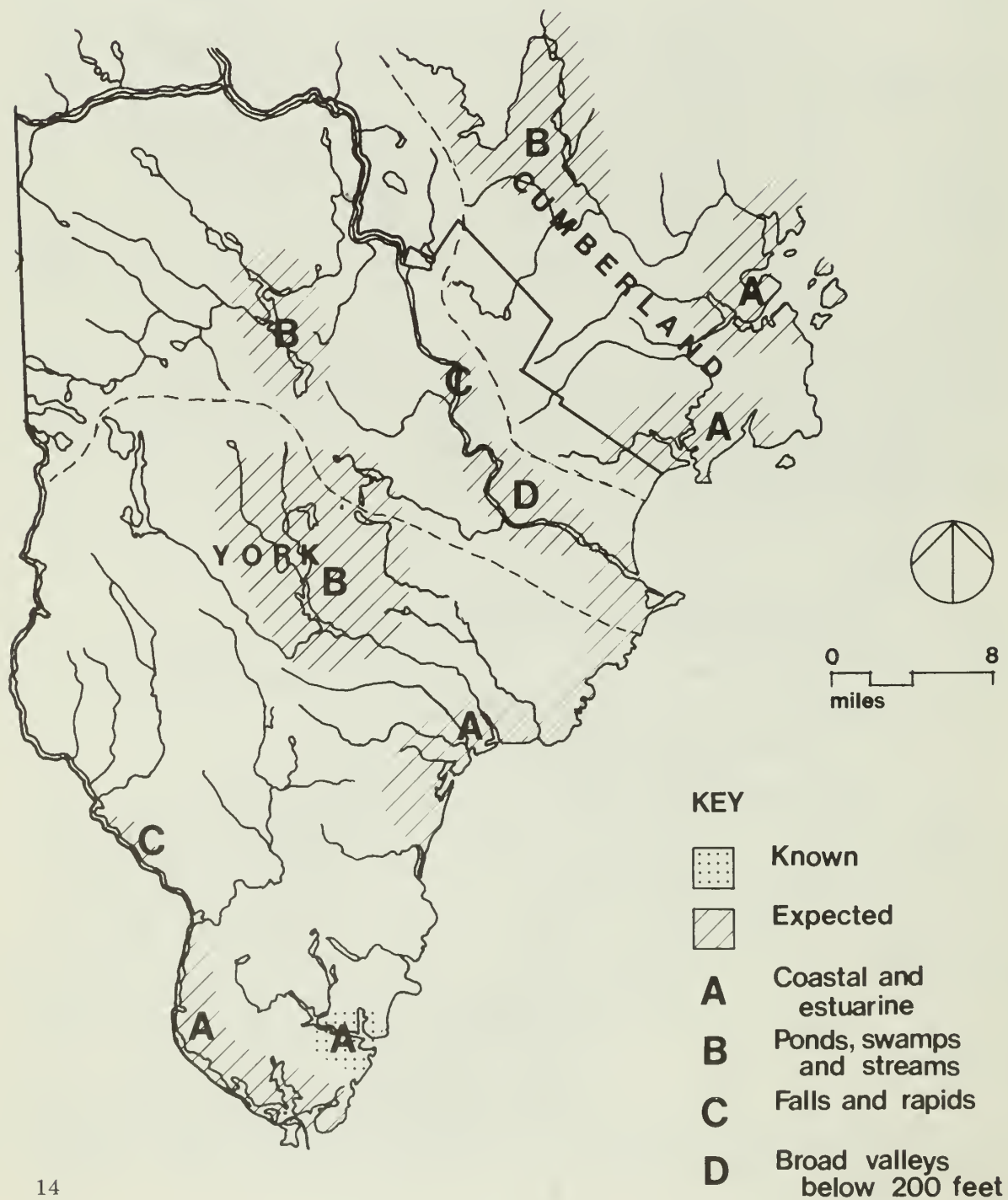
TABLE 2
Recorded Site Densities and Soil Categories by Drainages

	Drainage Basins		Known Sites per Square Mile**	Percentage of Sites per Soil Category*								
	Number of Sites Reported	% of Basin Included		A	B	C	D	E	F	G	H	X
Merrimack	381	30	.24	65.8	4.2	9.9	2.6	17.6	.5	.8	1.0	1.6
(Mass.)	299	71	.35									
(N.H.)	82	17	.13									
Massachusetts Bay and Essex Shore	339	84	.38	49.4	8.3	20.1	3.5	4.1	.9	4.4	2.4	10.4
Piscataqua	35	85	.04	31.4	20.0	8.6	2.9	22.9	—	17.1	—	5.7
Presumpscot	2	10	.01	—	—	50.0	—	—	—	50.0	—	—
Saco	20	38	.03	10.0	20.0	10.0	5.0	10.0	—	35.0	5.0	5.0

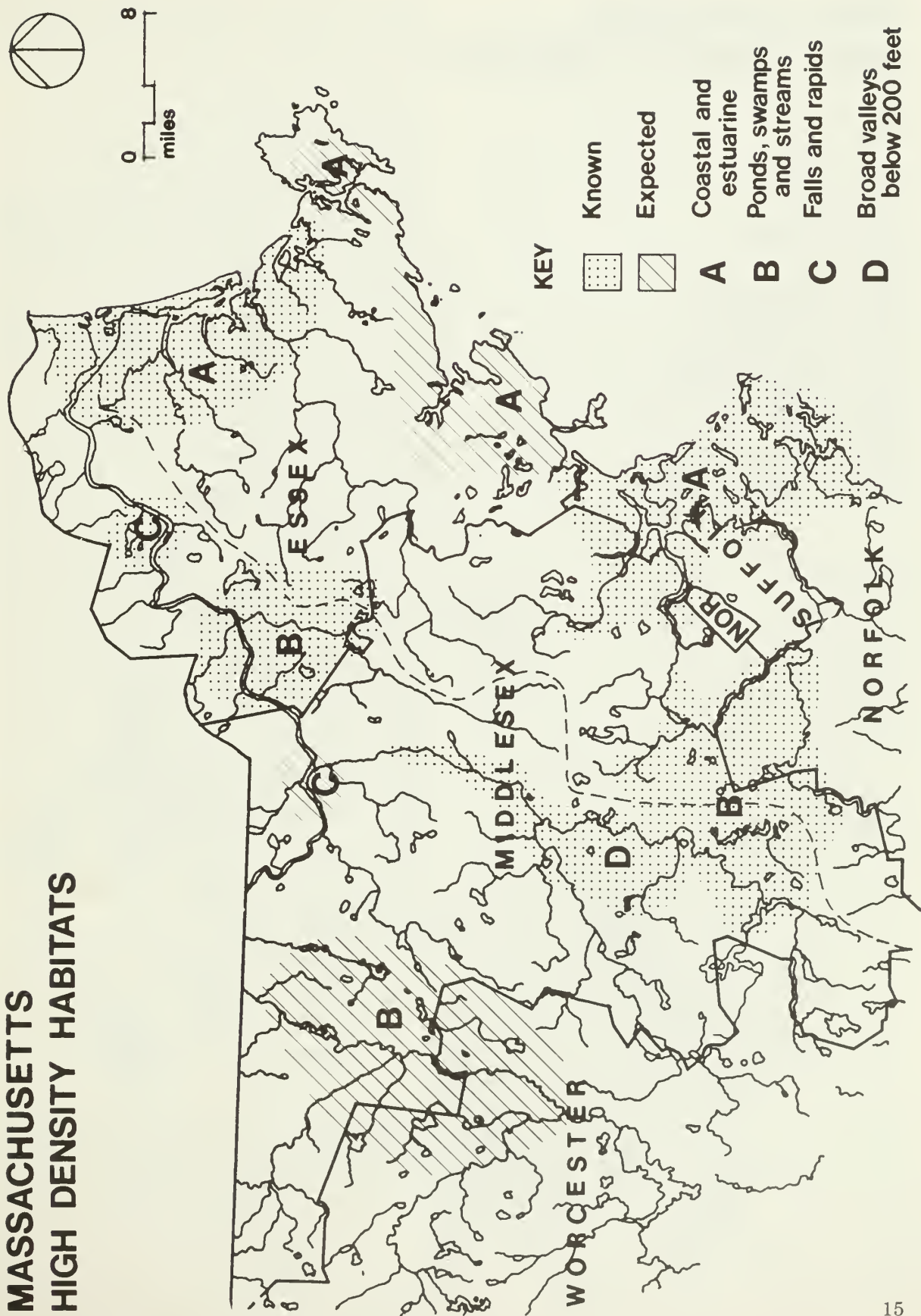
*Totals may exceed 100% because some sites are on more than one soil

**Unrealistically low, see text for discussion

4 MAINE HIGH DENSITY HABITATS



MASSACHUSETTS HIGH DENSITY HABITATS



NEW HAMPSHIRE HIGH DENSITY HABITATS

KEY



Known



Expected

A

Coastal and
estuarine

B

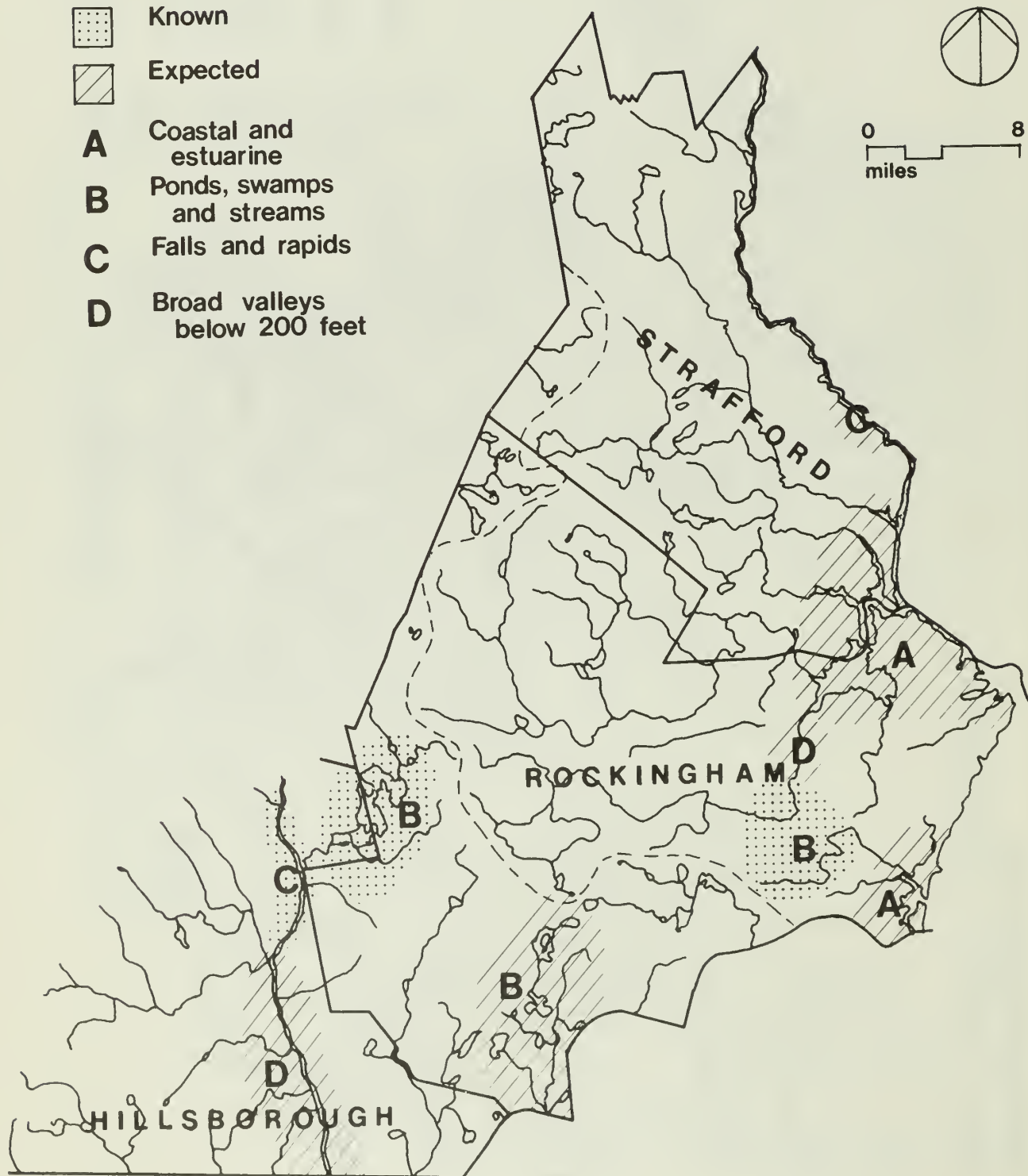
Ponds, swamps
and streams

C

Falls and rapids

D

Broad valleys
below 200 feet



sites have been subject to erosive processes longer than younger ones, and may be expected to have been destroyed to a relatively greater extent.

The selective destruction caused by cultural forces is even more serious, and in the survey area it has been of especially long duration. Plow agriculture, urbanization and general population growth, the Industrial Revolution, expanding transportation facilities, quarrying, and relic collecting have a longer history in the survey region than in any comparable area in the country. The unique richness of New England's historical cultural resources testifies directly to the destruction of the prehistoric resources. The native coastal village sites of the early seventeenth century were early destroyed by English residential clusters. The great sites at river fishing stations were among the first casualties of the Industrial Revolution because their situations, at falls in the rivers, where ideal locations for waterpowered mills. The ancient caribou hunter sites and most later cemeteries were situated on high, well-drained, sandy soils, now prized for quarry sites. Many of the largest ancient habitation sites were situated on level to moderately-sloping, well-drained soils (Category A, Tables 1 and 2, and Appendix B). These locations are prime sites for modern residential and industrial developments because of those same drainage characteristics. Map 7 shows the relationship between urban and industrial development and major site destruction. The losses already sustained in the suburban areas are only relatively less severe, not by any means negligible. The figures on site destruction given on Table 3 are almost without significance, being wholly dependent upon the quality and intensity of site reporting in any given area. Notice that the number of sites whose present condition is unknown is over 60% of the total in all states.

Evaluation of the Resource Base

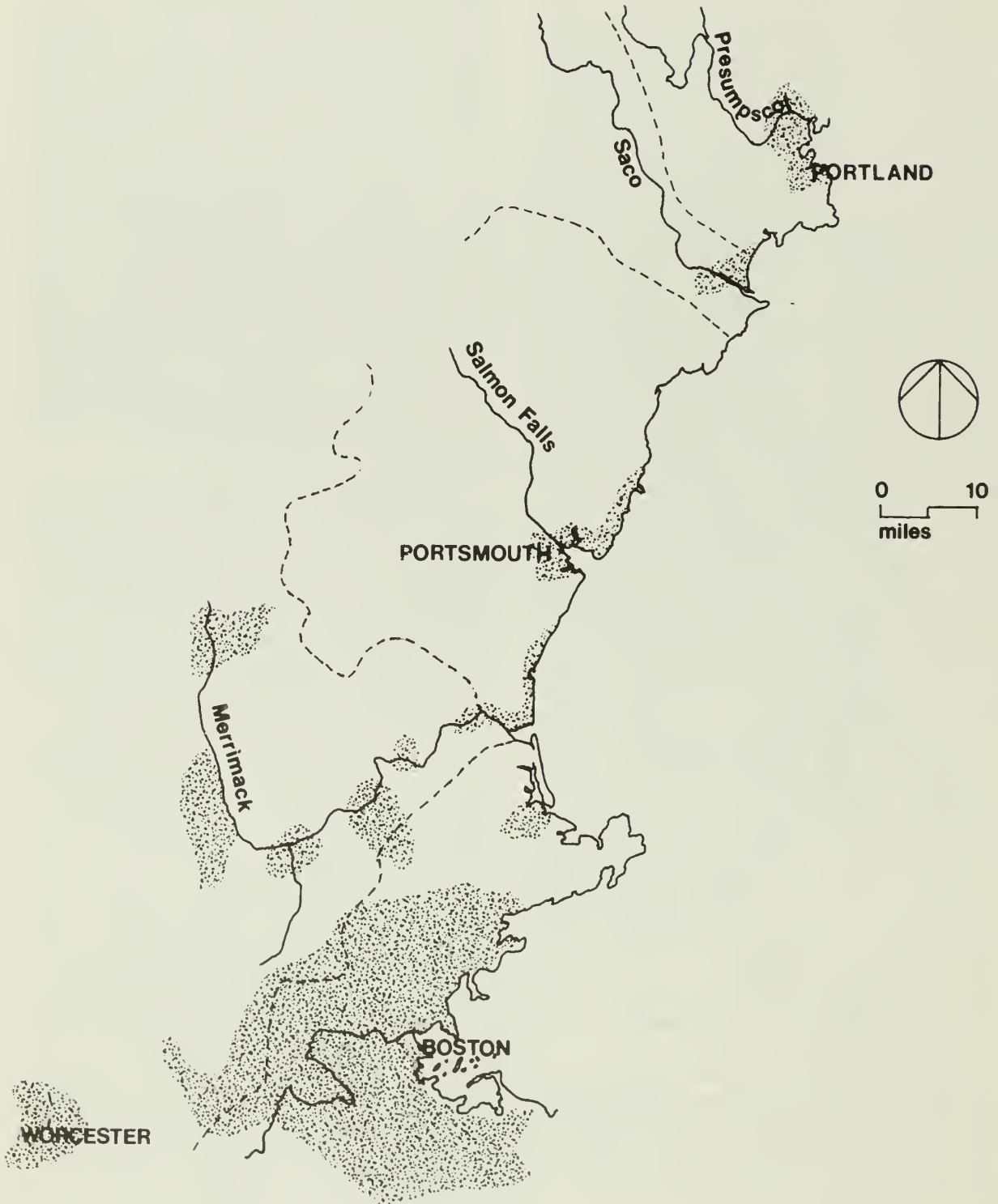
The significance of the remaining archaeological sites in the survey region derives from 1) the demonstrated long duration of human occupation in a region which has undergone major environmental changes, 2)

the uniqueness of the habitats represented in the region, and 3) the heavy destruction which has reduced the site population to a fraction of its original size. Southwestern Maine is ecologically distinct from the rest of that state, and is effectively unknown prehistorically. It is of great interest because it occupies an intermediate position between the distinct cultural provinces of eastern Maine and southern New England. That part of New Hampshire represented in this survey includes all of the tide-water habitats of the state and almost all of the land surface below 200 feet in elevation. The Massachusetts coast between Boston and the New Hampshire border includes several unique habitats, as diverse as rocky Cape Anne and the sandy islands of Boston Harbor. Between the coast and the uplands of Worcester County lies a large segment of the distinctive physiographic province called the Seaboard Lowland which, together with the coast, was the most heavily populated part of the state prehistorically, as it is now.

The greater part of the sites have been destroyed, but even in the area of metropolitan Boston, some 21% of the recorded sites retained at least a marginal research potential as recently as 1971. In less heavily developed areas, higher percentages may be expected. This represents a small, unquantifiable proportion of the original resource base. It is shrinking daily as construction projects change the landscape and relic collectors sift the soil for artifacts.

The importance of these remnants may be seen in a brief review of research highlights to date. The 4500 year old fishwier studied in building excavations near Boylston Street in Boston's Back Bay section has no known counterpart in the country. The large caribou-hunters' camp on Bull Brook in Ipswich remains unique in New England twenty years after its recognition. In Manchester, New Hampshire, a small segment of a formerly extensive site revealed the stratified remains of 8000 years of prehistory, and revolutionized concepts of human adaptation in the Northeast. The shellmiddens still remaining along the coast between Boston Harbor and Casco Bay may contain few artifacts, but will be crucial for the reconstruction and understanding of coastal ecology for several thousand years

SURVEY REGION HEAVY SITE DESTRUCTION



into the past (Appendix A1).

With archaeological methods improving rapidly, future research in the remaining sites could greatly enrich our knowledge of the past, including those past environmental conditions which have contributed to shaping the present.

The Advisory Council on Historic Preservation has published criteria for identifying archaeological sites which qualify for inclusion in the National Register of Historic Places (Procedures for the Protection of Historic and Cultural Properties, Chapter VIII Part 800). Those sites are eligible for listing which "have yielded, or may be likely to yield, information important in prehistory or history" (800.10 (a4)).

It is clear that there exist, even within the urban centers of this survey region, many sites which meet National Register criteria. Sites which still retain significant portions of their original structure in either the horizontal or vertical dimension may be expected, on the

basis of the precedents cited above, to yield "important information." Such sites should be protected from further damage as a matter of public policy, whether listed on the National Register or not.

The record of public stewardship of archaeological sites and data is poor in New England. It need not remain so. Table 4 displays some of the parameters of public concern, including the current status of public ownership of sites. Most, but not all, publicly owned sites have already been lost; those still extant could be protected by enlightened management policies. Federal and State land-management agencies are becoming aware of their responsibilities toward cultural properties. Other public interest groups, beginning with town and city governments and extending to educators, youth-service organizations, and conservation groups must be alerted to their equally serious responsibilities in public interest.

TABLE 3
Site Conditions as of 1973

	Sites in Survey	>50% Intact	<50% Intact	Known Destroyed	Condition Unknown
Maine	24	8.3%	4.2%	8.3%	79.1%
Massachusetts	638	1.4%	10.3%	26.3%	61.9%
New Hampshire	115	3.5%	—	12.2%	84.3%

TABLE 4
Public Stewardship

	Massachusetts	New Hampshire	Maine
Public Ownership	14.8%	1.7%	4.2%
Collection Preserved in Institution	30.1%	56.5%	0
Excavated with Records	6.3%	6.9%	0
National Register Listed Feb. 1974	1.0%*	0	0
Number of Sites Recorded in Survey	638	115	24

*Incidentally included in two historic areas

Past and Projected Cultural Landscape Modifications

As serious as is the accelerating site destruction caused by casual digging and unreported excavation, the major causes of destruction, past and future, are industrial and residential developments and the transportation facilities and other landscape modifications which accompany them (Map 7). The data on current and future land use which are summarized below were compiled in order to indicate those locales within the survey region which are likely to experience the most intensive development, and therefore archaeological site destruction, in the next few years (Maps 8, 9, and 10).

The increasing rate of development and its attrition of the natural landscape has brought about a new awareness of the need for centralized planning, coordination, and control of development. Thus, in the past two years, Maine and Massachusetts have reorganized their administrative structures for environmental planning and resource management, and New Hampshire is in the process of developing its own structure. Many of the new policies for environmental protection are potentially applicable to problems of archaeological resource management, some requiring no more than administrative extension to include cultural resources.

Because administrative structures, environmental policies, and growth patterns are distinct for each state, the general summary below will be followed by a brief review of specifics in Maine, Massachusetts and New Hampshire. The fragmentation of responsibility for development within discrete environmental zones is one of the major shortcomings of resource planning in New England. This situation presents archaeological conservationists with administrative problems rarely encoun-

tered elsewhere, except along the Middle Atlantic coast. Not only are environmental zones frequently subdivided by state boundaries, but the long-standing tradition of town autonomy in planning makes conservation policy planning especially difficult and sensitive in New England.

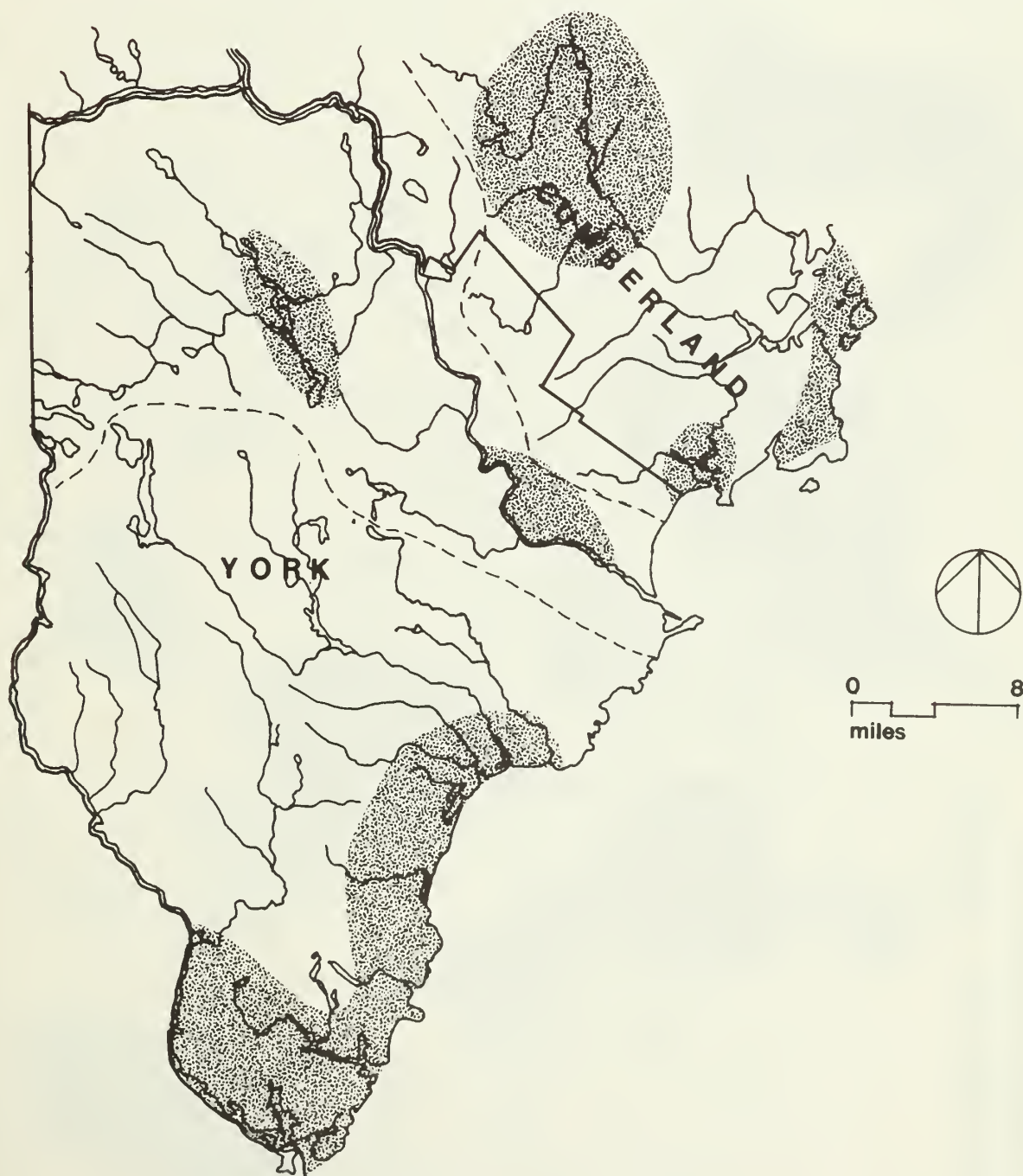
General Pattern of Urban Development

Megalopolis is expected to continue encroaching on the New England landscape, with the Boston metropolitan complex linking up with the clustered urban developments along the Merrimack River by the turn of the century (Map 11). While expansion will also occur around several more northern coastal nuclei, intensive urban development along the coast was not expected to result in a continuous urbanized ribbon when these projections were made in the late 1960's by NAR.* A more detailed analysis reveals urban land use scattered throughout the study area (Maps 13, 16, 19) and most of these urban centers plan for increasing urban use of their surrounding area by industry, commerce and, most frequently, residences. Table 5 suggests the increasing proportion of the study area that will be devoted to urban development.

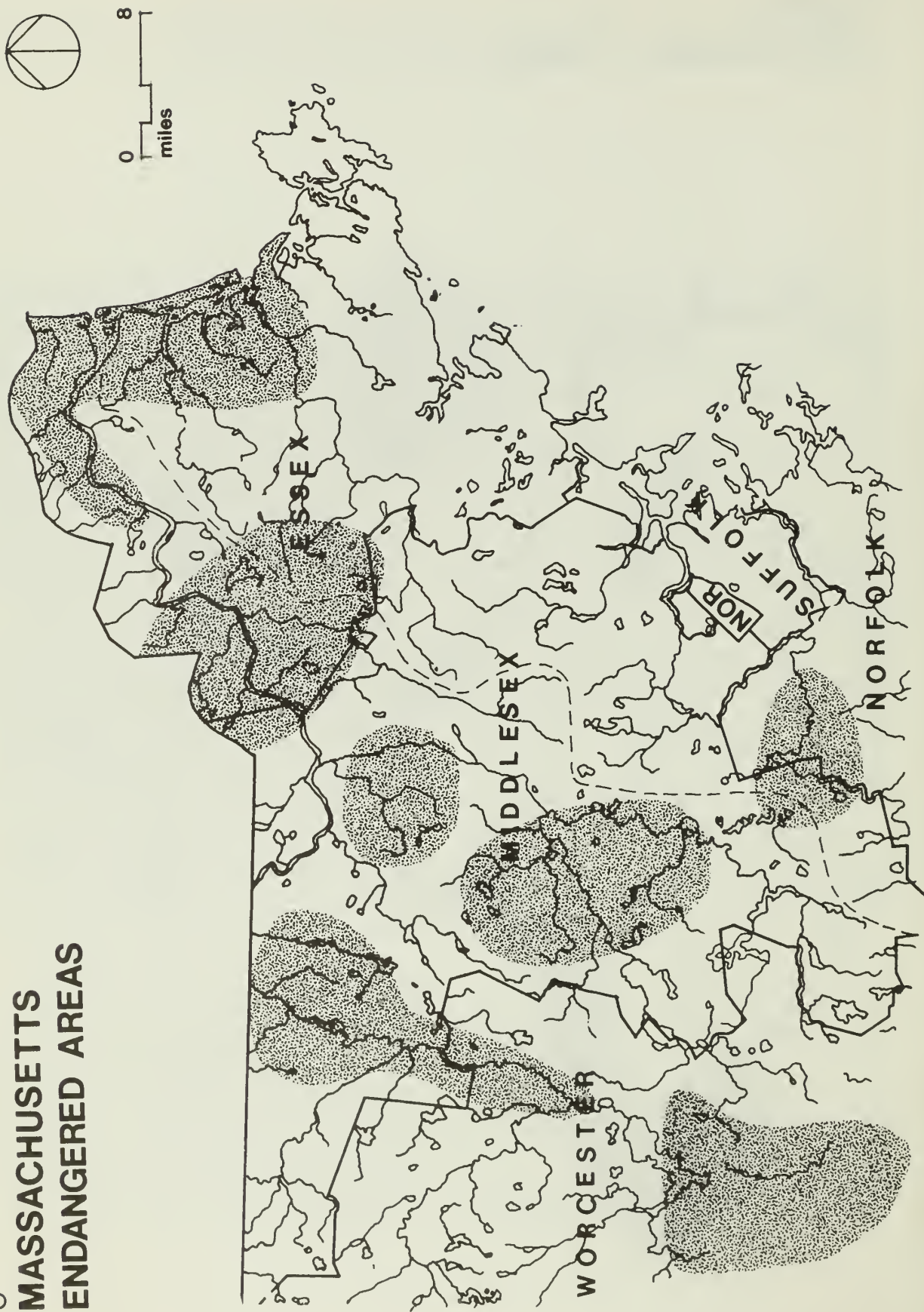
Accessibility and availability of water, public services, large sites, and natural amenities appear to be the prime determinants for future urban development. Most industrial use of land in newly urbanizing areas is predicated on accessibility to raw materials and markets via good highways or railroads. Coastal shipping facilities are important primarily

*North Atlantic Regional Water Resources Study Coordinating Committee

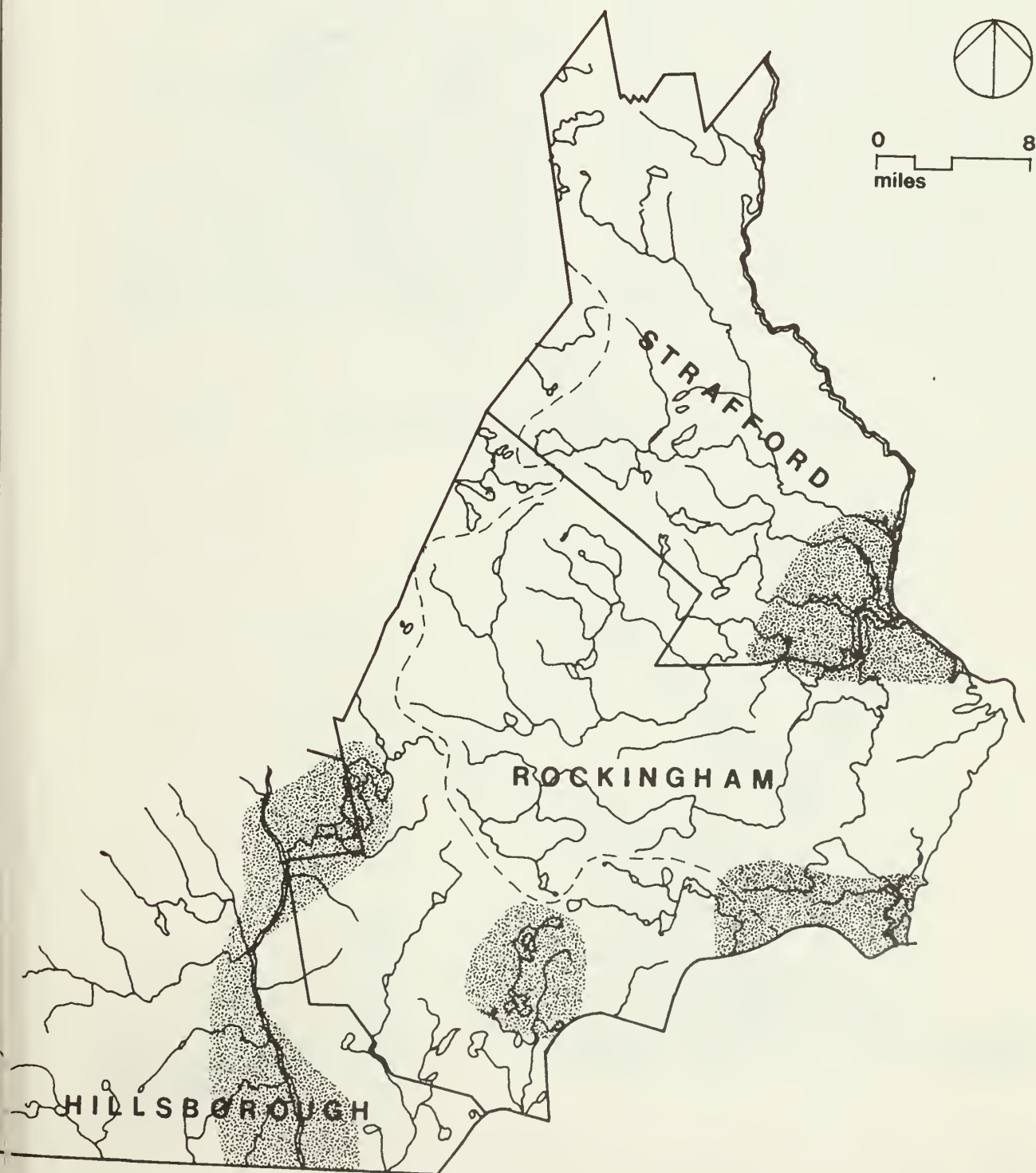
MAINE ENDANGERED AREAS



9 MASSACHUSETTS
ENDANGERED AREAS

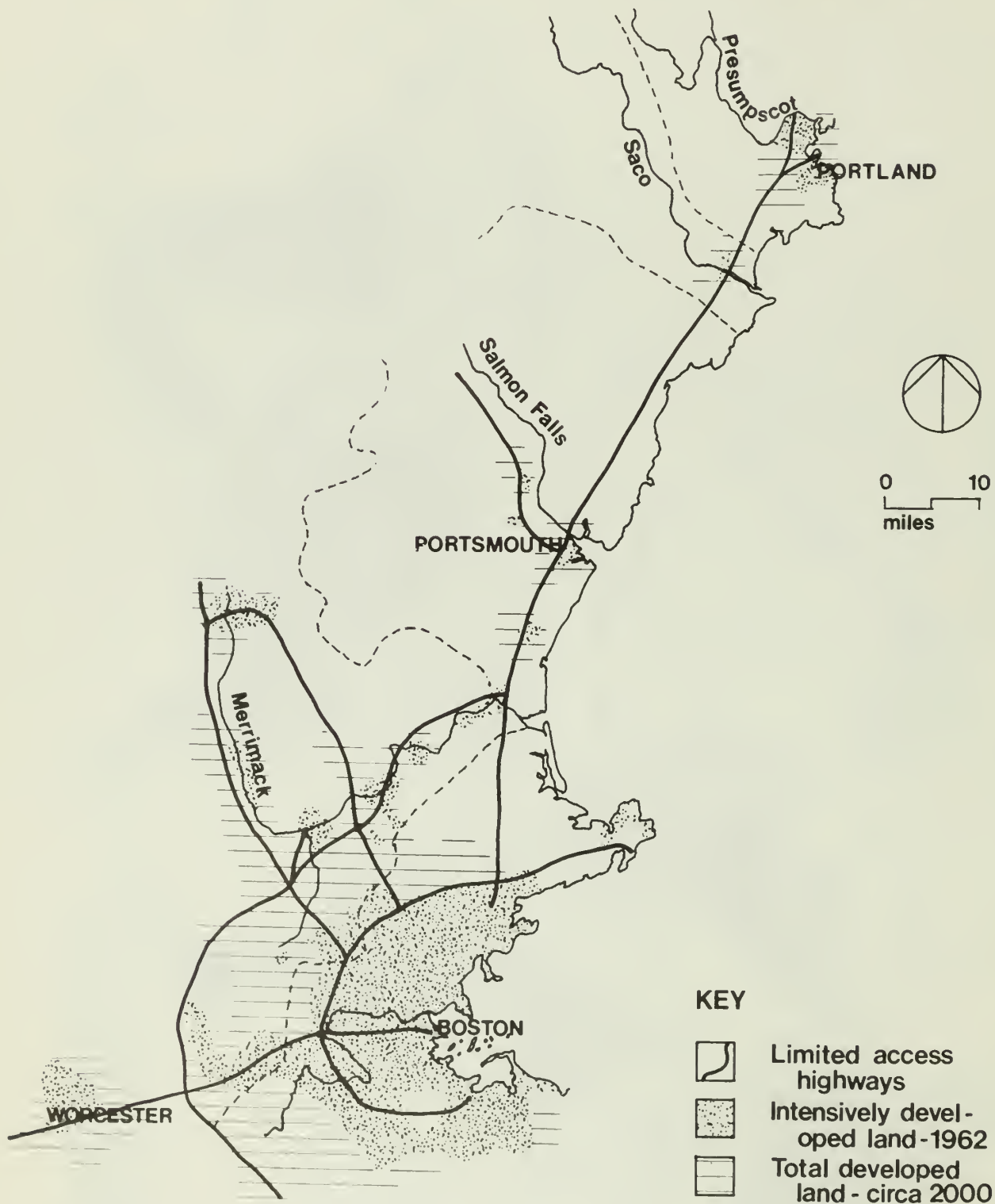


10
**NEW HAMPSHIRE
ENDANGERED AREAS**



SURVEY REGION

PRESENT AND PROJECTED URBAN LAND USE



for heavy industrial development such as refineries. Proximity to employment provides the measure of accessibility for residential development; the network of limited access highways, particularly to the west and northwest of Boston, provides accessibility to a variety of employment opportunities for a substantial portion of the study area.

Public services such as water, waste disposal, and power make urban development feasible in denser concentrations and attract industrial and commercial development as well. The availability of large or easily assembled sites can attract large scale industrial or residential developers. In fact, the necessity of large sites has occasionally led to alterations in the physiography of the area, primarily in terms of landfill on wetlands or leveling of slopes. The landscape itself affects the pattern of urban development. The desire for non-urban, or at least semi-rural, environments

has spurred much of the urban development on the fringes of the large urban area, while lakes, ponds, and the coastline offer a powerful lure for second home and other recreational developments.

Planning for urban development takes place at many levels of authority from multi-state agencies like the New England River Basins Commission through state planning offices and within state regional planning commissions down to town planning boards. Since zoning control is vested with the towns, most of the other planning agencies serve primarily as consultants for town decision-making about urban development. For certain environments such as floodplains and the coastal zone, however, the federal and state governments are assuming preemptory powers and town zoning and land use must meet specifications set by the higher governmental authority.

Those concerned with the planning of

TABLE 5
Developed Land in Urban Subregions of New England
1962 and 2000*

	Urban Subregions**			
	Portland Me.	Portsmouth N.H.	Concord- Manchester N.H.	Boston Ma.
Total Land Area (sq. miles)	3455.0	1068.0	1819.0	3002.0
Total Developed Land 1962 (sq. mi.)	174.0	31.5	56.7	603.8
% of Area Developed 1962	5.0%	2.9%	3.1%	20.1%
Total Developed Land 2000 (sq. mi.)	224.5	70.7	106.0	942.9
% of Area Developed 2000	6.5%	6.6%	5.8%	31.4%

*Based on Tables 4 and 5 of North Atlantic Regional Water Resources Study, Study of Present and Projected Urban Development and Land Use in North Atlantic Region (Preliminary Issue), March 1969.

**Portland: York and Cumberland Counties, plus three more adjacent counties. Portsmouth: Strafford and Rockingham Counties. Concord-Manchester: Merrimack and Hillsborough Counties. Boston: Essex, Middlesex, Norfolk, Suffolk, Bristol and Plymouth Counties.

urban development utilize a variety of policies and practices to channel urbanization. Future industrial land use, for example, is clustered in industrial parks, while planners for the state of Maine have gone so far as to advocate concentrating most of Maine's heavy industry in two coastal clusters rather than despoiling larger areas of the coast. Plans for heavy industry in an area can create a great deal of friction among opposing interests (Map 12). Clustering new residential and commercial development by means of careful planning of services such as sewers and water or through cluster zoning are options considered primarily in the planning offices at the present time. Present zoning policy in most of the area encourages scattered, large lot development and strip commercial districts.

New England's landscape is one of its major resources and planners evidence concern for preserving the environment. They advocate channeling or clustering of urbanization, protection of fragile areas such as coastal zones and wetlands, and preservation of areas of open space. By including many floodplains as potential open space, the planners also hope to discourage urban development in these critical zones. Notions that the environment itself suggests development limitations have great currency among planners, and are used by SENE (the Southeast New England study) of the New England River Basins Commission for suggesting the developmental character of towns, by states in developing coastal zone management policies, and by several regional planning commissions in making planning recommendations. Natural resource areas have been identified and protection advocated (Map 12), including areas with special physical or cultural features or areas with a unique combination of the two.

While the hierarchy of planners in the study area makes recommendations for directing urban development, other agents are also involved in determining the course of urbanization. The federal government helps finance the urbanizing process through grants for transportation, water systems, and development programs, while it also helps fund open space acquisition efforts. Federal laws concerning floodplain and coastal zone protection, and

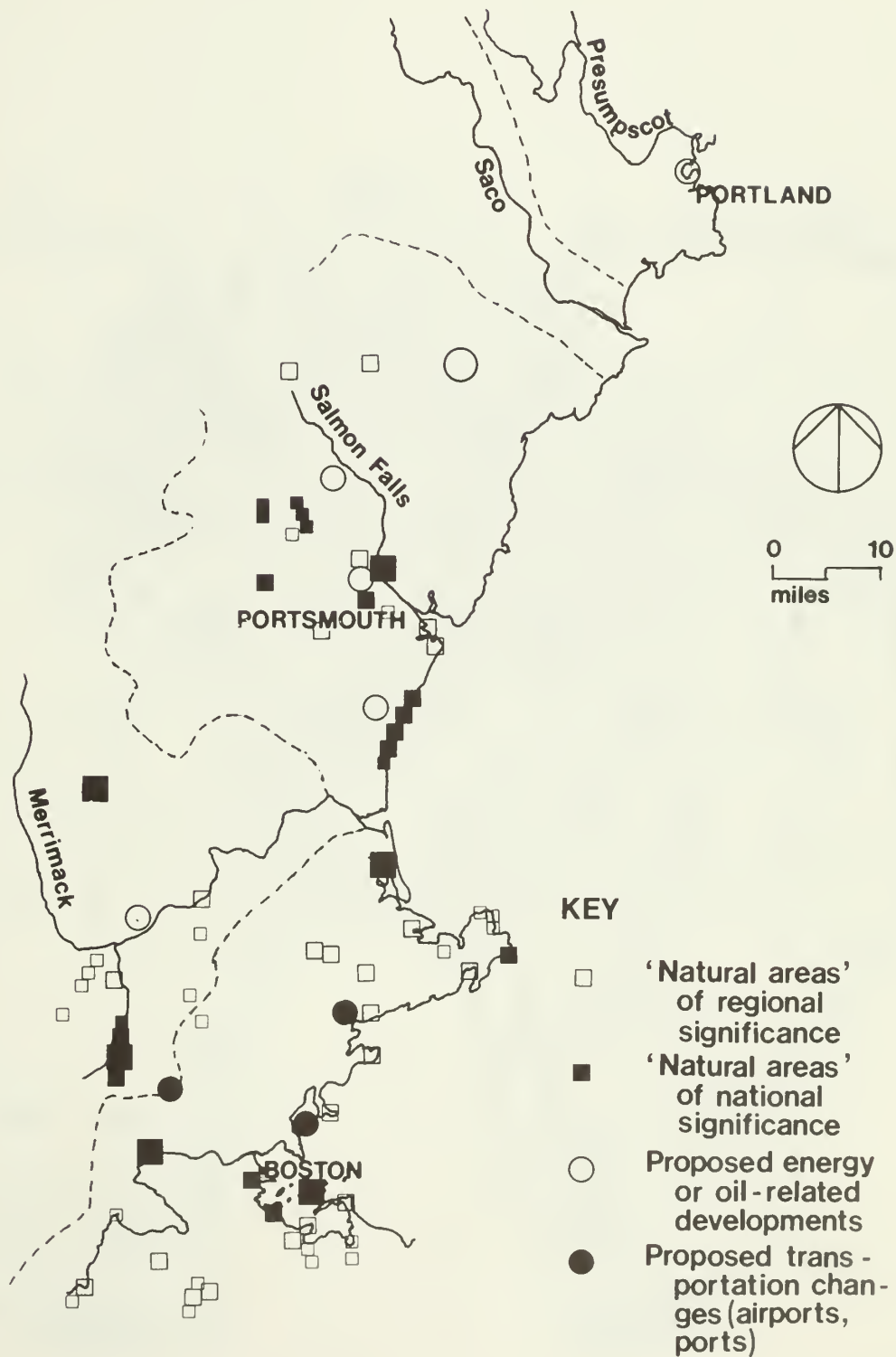
the required environmental impact statements for federally funded projects provide some regulation of urban development. State governments similarly provide some financial assistance, especially for transportation improvements and open space acquisition, some support for development activities, and some regulation of land use. The latter takes the form of regulations for certain types of areas like the coastal zone or required state approval of any large development project. The towns likewise help finance urban development by constructing roads and water and sewer systems and often by laying out industrial parks and soliciting occupants for them. Zoning provides the town with explicit means to channel urban development within its boundaries. However, the various government authorities are obviously not the only decision-makers in the urban development process. Private developers, whether operating on a large scale like a refinery or a subdivision (Map 12) or the scale of a small manufacturing plant or several houses, also affect the direction or urban development. And ultimately, the present and future residents of the area, by their choice, will create the urbanized area of the future.

Maine

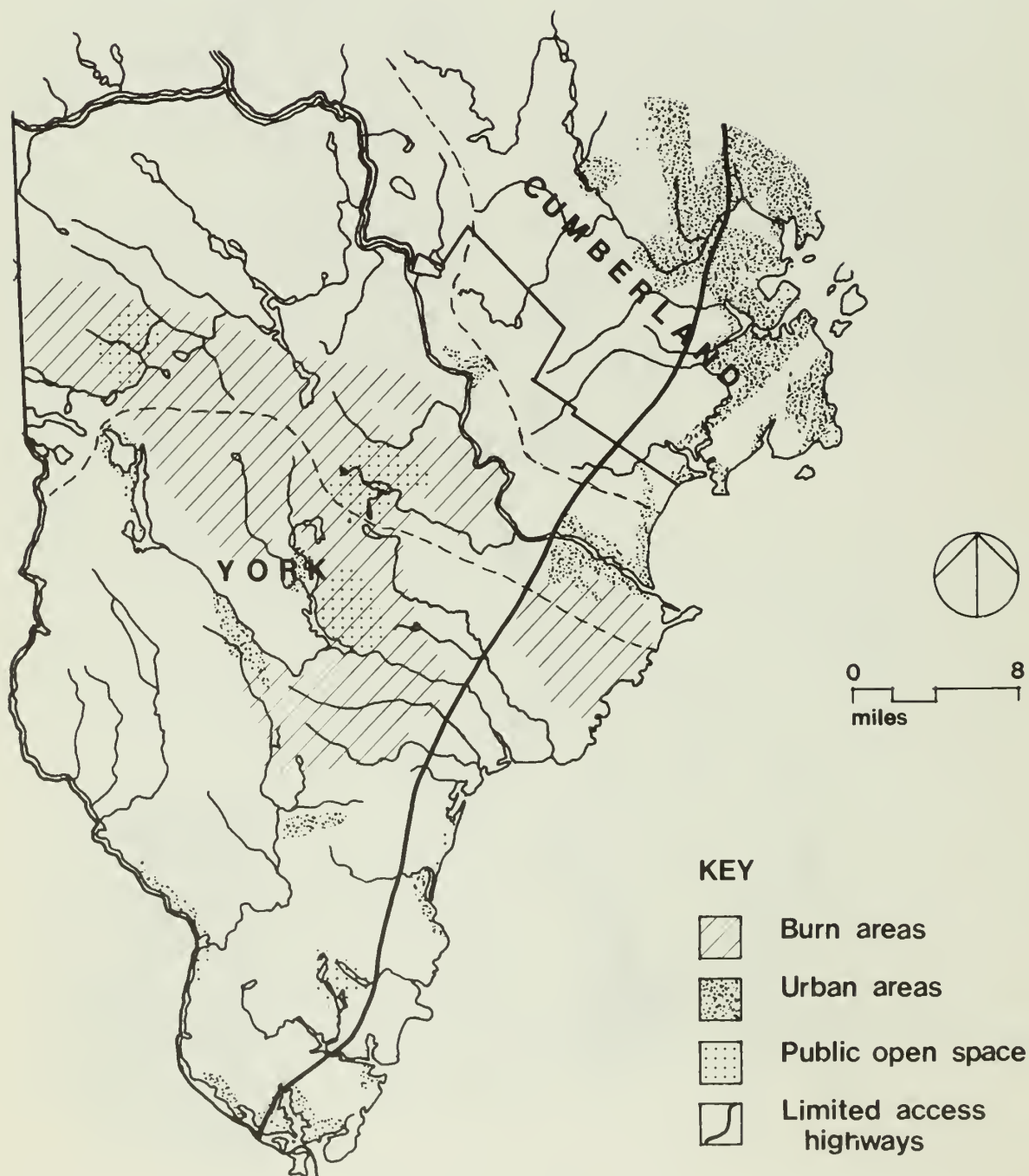
Urban areas in southern Maine, with a few exceptions like Sanford, Alfred, and Berwick, are concentrated near the coast (Map 13). Besides Greater Portland, with its urban tentacles following transportation routes, the two largest urbanization areas are concentrated near the mouths of the Saco and Piscataqua Rivers. Strips of coastal urban development like Old Orchard Beach and Ogunquit have their inland counterparts in the second-home developments around the larger lakes. Public and sem-public open space in the area consists principally of several large tracts of experimental forest in the large portion of York County that was burned over in severe forest fires in 1947. Several smaller state and local parks exist, including newly acquired state property surrounding the great ponds just north of York and the Rachel Carson Wildlife Refuge.

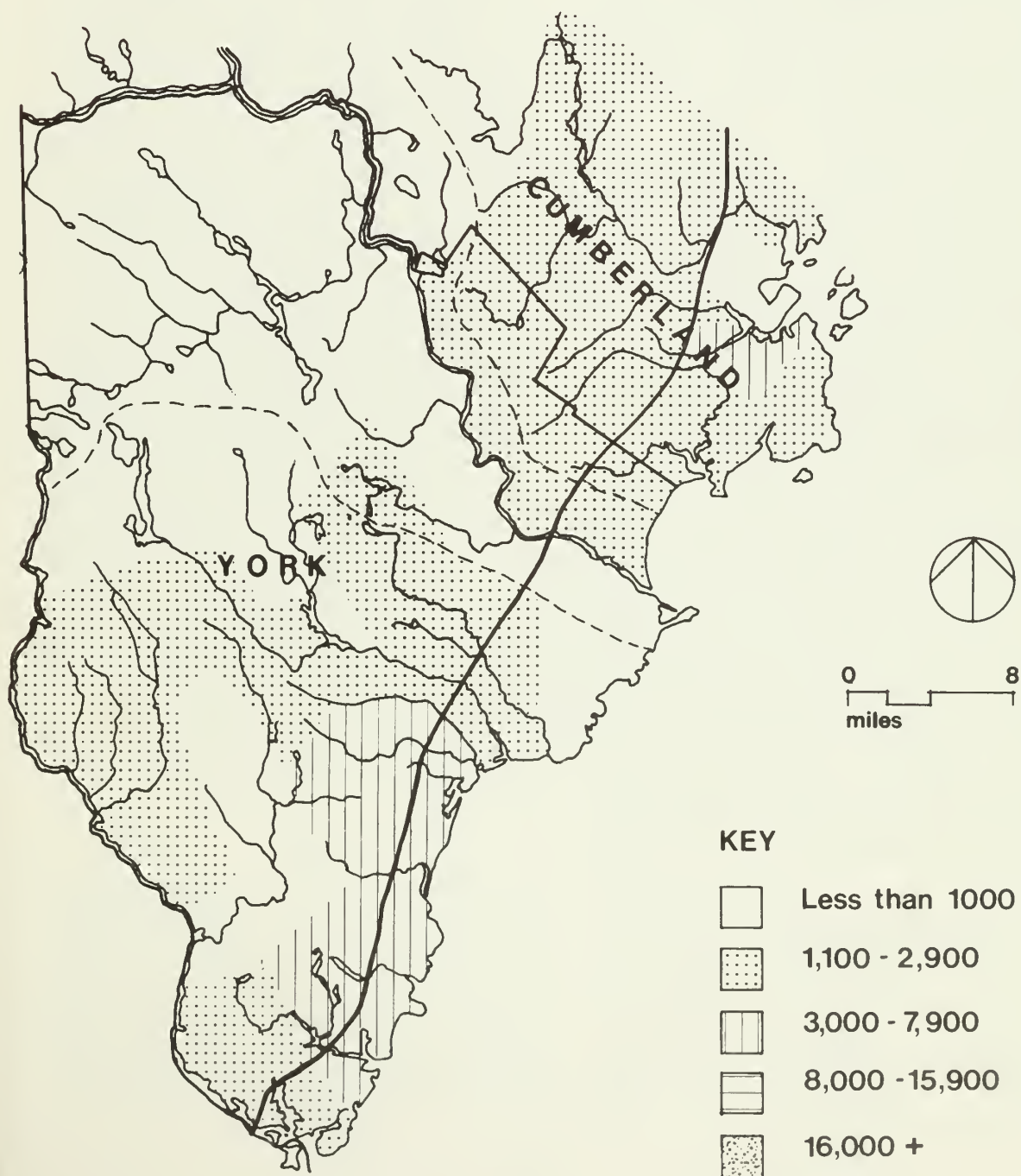
SURVEY REGION

SOME PROPOSALS FOR LAND USE



13
MAINE
EXISTING LAND USE



MAINE**PROJECTED POPULATION CHANGE, 1970 - 1990**

While projections of population increase in southern Maine do not anticipate the tremendous growth expected in portions of New Hampshire and Massachusetts, stagnation is not anticipated (Map 14). Suburban Portland towns expect several thousand new residents by 1990. Redicted growth in the Saco-Biddeford area reflects accessibility via good highways to the Portland metropolitan area and the anticipated increase in employment opportunities in Biddeford. Several coastal towns and Sanford in York County also anticipate significant growth, based on past trends in population growth and plans for increasing employment opportunities in the area.

Given present urban land use in southern Maine, the "Threshold to Maine: Resource Conservation and Development Plan" projections of urbanizing areas might seem excessive, even when adjusted for zoning policies (Map 15). However, applications to the Department of Environmental Protection under the Site Location Act (see below) for 1970 to 1972 show considerable development being planned, and applications are increasing. Similarly, substantial efforts to improve the economic base are being undertaken in York County, focusing on industrial park development and a potential oil refinery in Sanford. Much of central York County land is in large holdings, acquired cheaply after the 1947 fire, and thus is considered susceptible to development. Increased urbanization in the Portland area reflects the continuing suburbanization process. Portland has also been designated as one of the two coastal sites for any future heavy industrial activity, including docking of oil tankers. Substantial second-home development is expected to continue on coastal and lake shorelines; some of this development, like Lake Arrowhead in northern York County with a potential 4000 units, is at a very large scale.

Regional planners anticipate a significant increase in public open space, partially to preserve the environment in the face of continuing urbanization. Additions are planned for the experimental forests in central York County, and continued acquisition of pond areas is anticipated, occasionally from private camps which go out of business. Wetlands along the

coast and the Saco River corridor will provide open space that serves a functional and esthetic purpose.




The state of Maine exercises considerable control over development, with mandatory shoreline zoning according to guidelines set by the state and applicable to 250-foot shoreland areas of all ponds greater than 10 acres, rivers with a watershed of 25 square miles or more, and the coast. Resource protection districts are to be created to protect water quality, productive habitats, biotic systems or scenic and natural values as defined by Federal, State or municipal governments. In addition; a law pertaining to site location of developments requires that all developments of more than 20 acres must be approved by the Board of Environmental Protection. Permits must be obtained from this Board for dredging construction or in great ponds, modifying coastal wetlands, and mining.

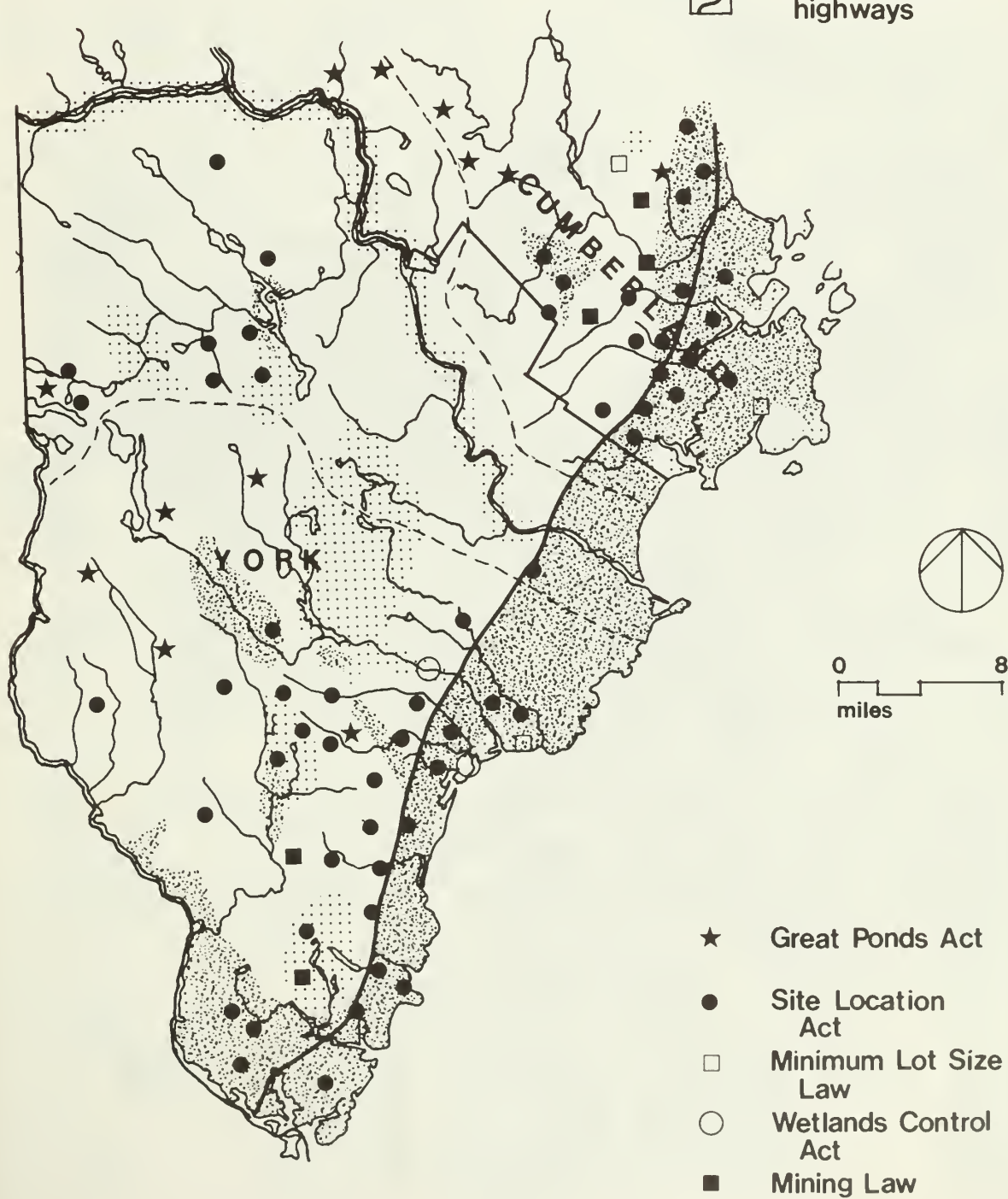
Exercising limited authority, the Southern Maine Regional Planning Commission, the Greater Portland Council of Governments planning department, and river basin commissions like the Saco Corridor Commission, attempt to coordinate development in particular areas. Both regional planning commissions create land-use plans and offer zoning advice to member towns, but in York County many of the towns, and particularly the coastal towns like York, Wells, and Kennebunk, are not members. Towns can zone land use at their discretion except in areas covered by state law. The zoning power, coupled with varying efforts at "economic development," suggests that the towns and private industrial and residential developers still have a great deal to say about where land will be converted to urban use.

Massachusetts

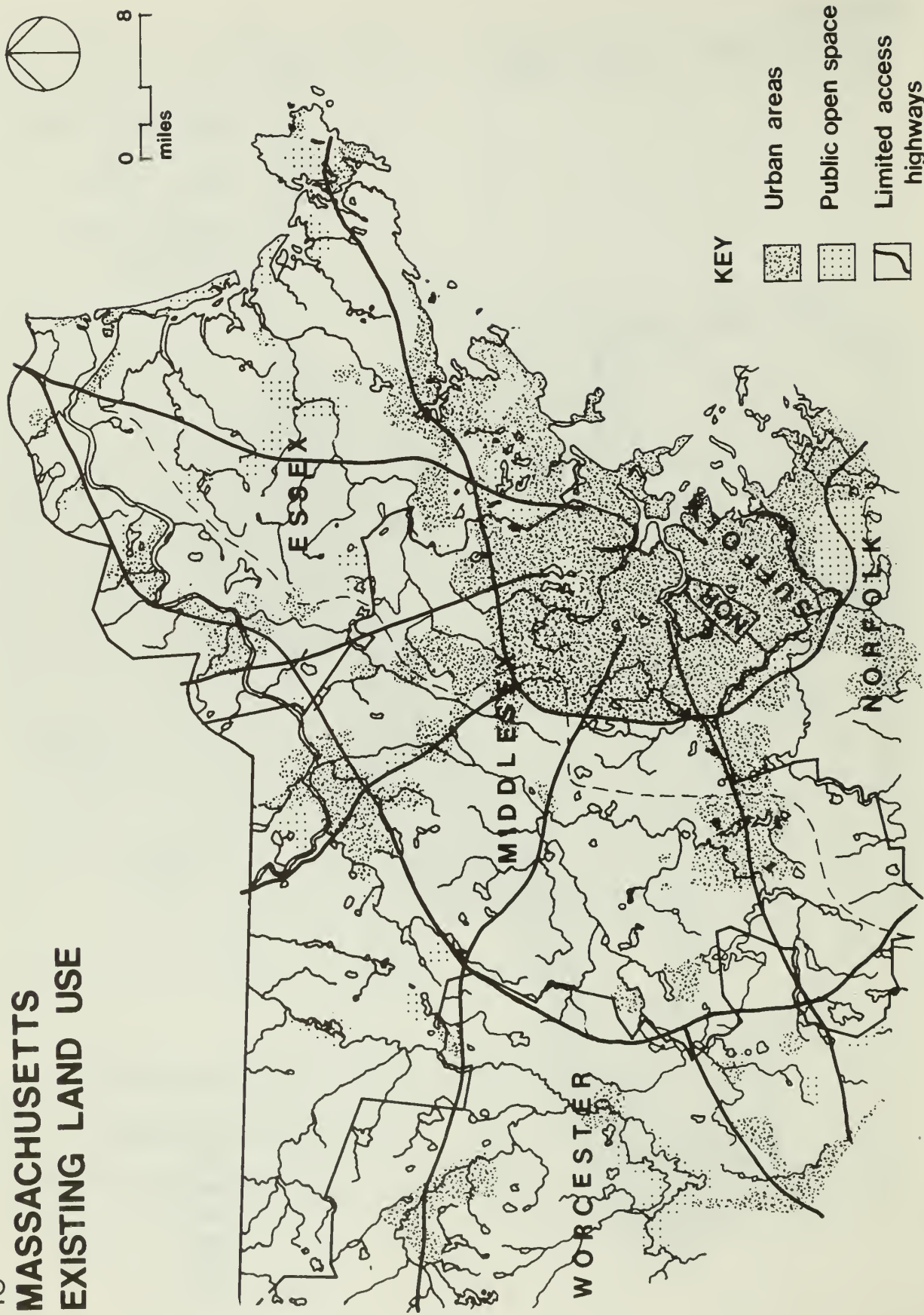
To those fearful of the expansion of Megalopolis beyond the Boston metropolitan area, the current distribution of urban land use in eastern Massachusetts offers some comfort (Map 16). With the exception of the string of urban centers along the Merrimack River, and tentacles reaching out between Rte. 3 and I-93 and along the Massachusetts Turnpike, intensive urban land use is confined within the cir-

MAINE**PROJECTED LAND USE****KEY**

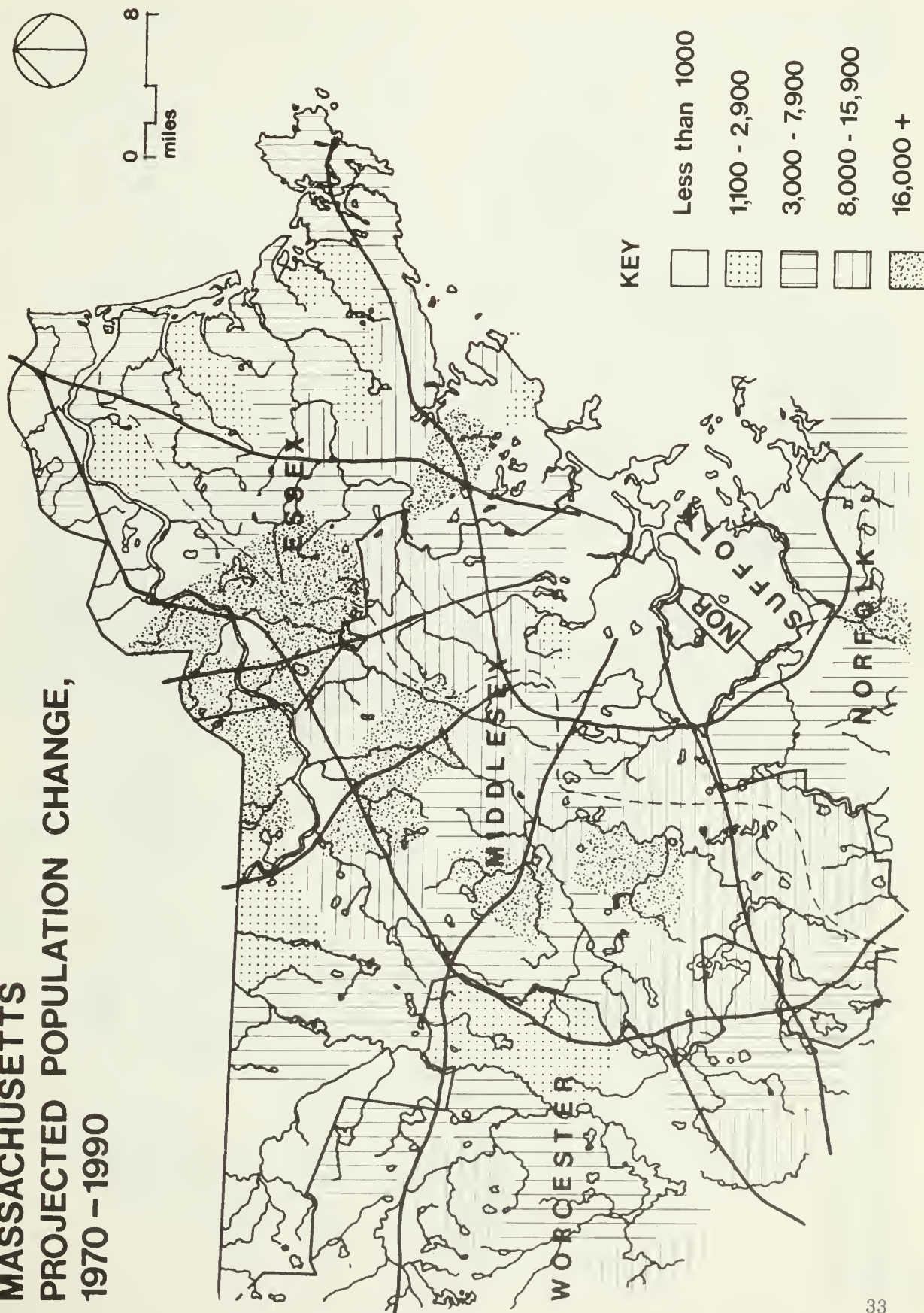
-  Public open space
-  Urban areas
-  Limited access highways



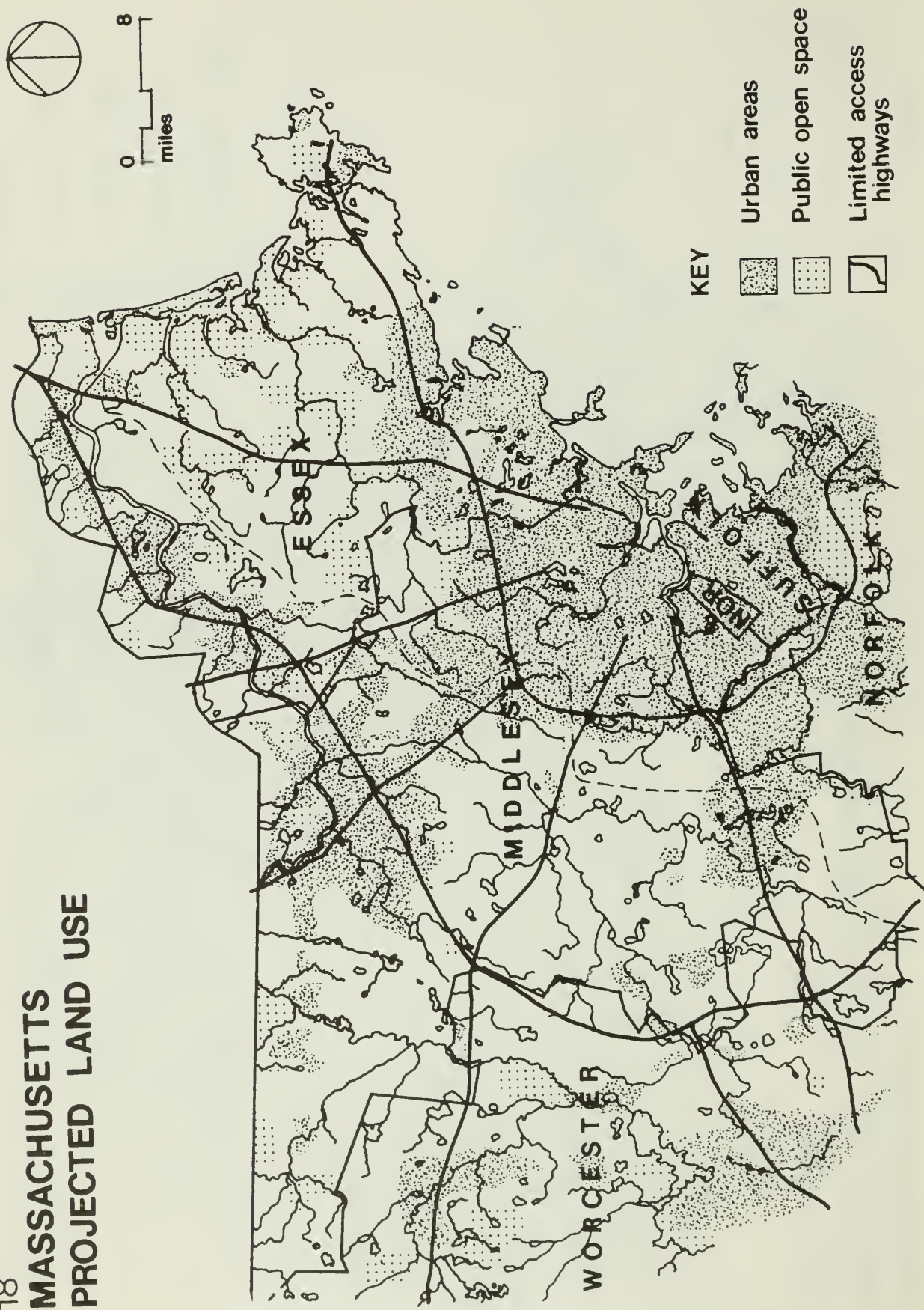
MASSACHUSETTS EXISTING LAND USE



MASSACHUSETTS PROJECTED POPULATION CHANGE, 1970 - 1990



MASSACHUSETTS PROJECTED LAND USE



cumference of Rte. 128 around Boston. Worcester and Fitchburg are the other major urban areas on the western edge of the study area. Several large acreages of public open space are available within reasonable distance of most urban residents; much of the public open space northeast of the Boston area is wetland.

The greatest population growth is anticipated between Rte 128 and I-495, but especially in the sector delimited by Rtes. 3 and I-93 into New Hampshire (Map 17). Accessibility to a variety of employment opportunities in the Boston area and the Merrimack cities of Lowell and Lawrence, amenity factors and available land without many restrictions for construction are all explanatory variables. The areas lower expected population increase to the northeast, along I-95, reflect poorer accessibility as well as more limited land suitable for construction.

Urban development is expected to coalesce along most of the Merrimack with a possible "green belt" separating Lowell from the urbanization closer to the mouth of the river (Map 18). The urban clusters of Fitchburg and Worcester will also expand. The subject of greatest controversy, of course, is the amount of territory the expanding Boston metropolitan area will engulf in the next twenty years. Indexes of development pressure defined for the SENE study of the New England River Basin Commission (based on population and employment change, accessibility by auto, and acreage of developable land with slight to moderate septic tank limitations) suggest that almost the entire area between the Merrimack River cities of Lowell and Lawrence and the Boston metropolitan area could be urbanized; however, various pressures exist to prevent such an occurrence. For example, the SENE study will recommend to towns in much of the study area that the wisest course of development would be a concentration and filling in of a compact area adjacent to Rte. 128, thus preserving more fragile land as a "land bank" for future, hopefully more innovative, urban uses. Similarly, some towns such as Andover are taking steps, principally by zoning, to prevent urbanization at an intensive scale.

The amount of land in the sector northeast of Boston recommended as open space or unde-

velopable by regional planners and the SENE study provides some substantiation for the lower population growth expected in that area. In Massachusetts, as in New Hampshire and Maine, planners advocate the preservation of wetlands and floodplains as open space. Recreational needs of the urban population are another stimulus for preserving public open space (e.g., the Boston Harbor Islands). Planners in the Lawrence-Haverhill area are advocating a green belt between their stretch of the Merrimack urbanization and the expanding Boston metropolitan area.

Massachusetts has recently added new legislation that will improve state control over urban development, already exercised through wetlands protection legislation and required environmental impact statements for all State-sponsored development. Farmland can now be assessed at use value rather than development value, which should slow down the rapid turnover of rural to urban land on the urban fringes. The state, through a special council, must also approve long range plans for power plant construction. Perhaps the most important control of land use exercised by the state is through the land-use bill for Martha's Vineyard, which focuses on "critical areas." If such a plan works well, it might lead to similar legislation for other areas in the state. Regional planning commissions, funded in part by federal funds, and groups like the New England River Basins Commission provide advice to towns in the area, but the towns have final say concerning development not controlled by state or federal legislation. Even the Martha's Vineyard bill encourages town control, but sets up a regional commission to regulate uses of "critical areas."

New Hampshire

Although information about present land use in southern New Hampshire is sketchy, the general pattern of urban use is linear, strung along the major river valleys—the Merrimack and the Piscataqua-Salmon Falls, the major highways, and the coast (Map 19). The two large clusters of urban development on the Merrimack—Nashua and Manchester—are a continuation of the pattern of urbanization

19
**NEW HAMPSHIRE
EXISTING LAND USE**

KEY



Urban areas



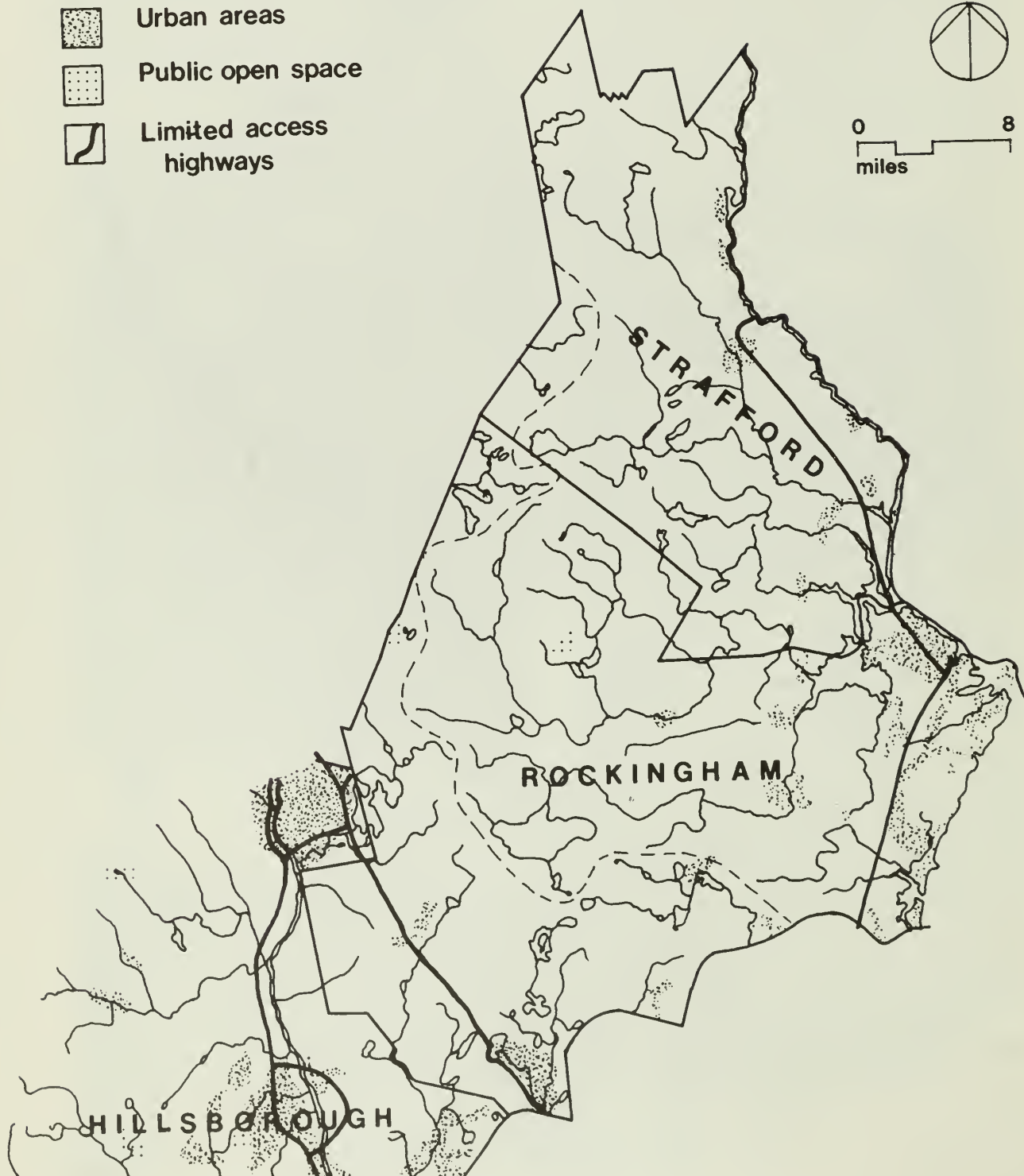
Public open space

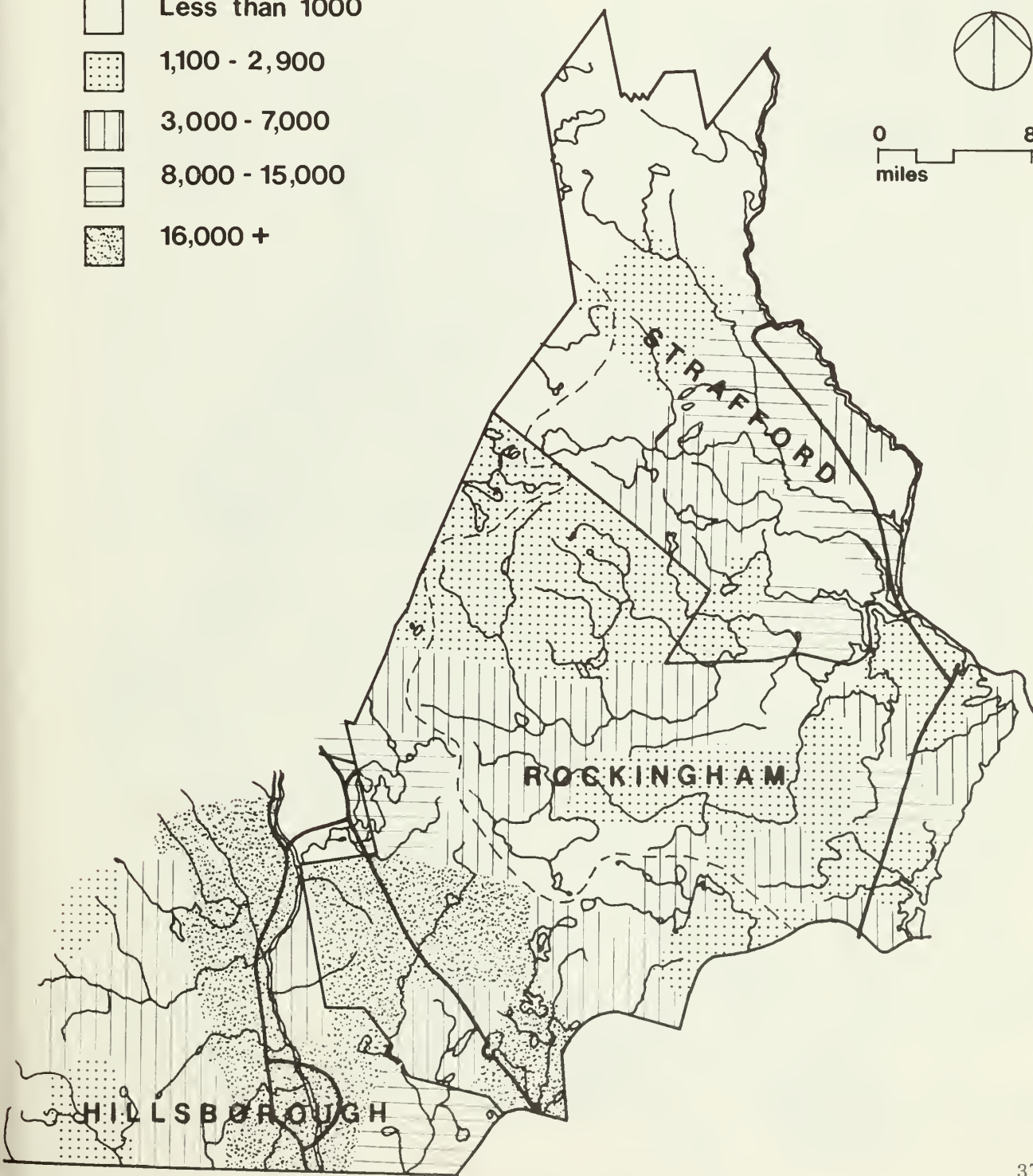
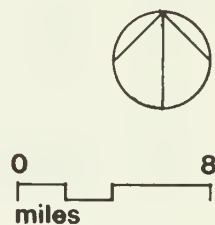
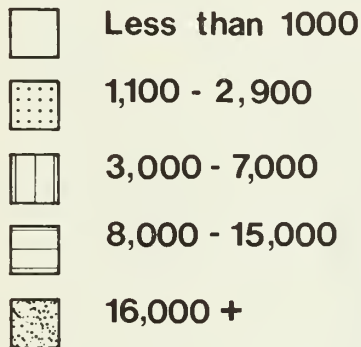


Limited access
highways



0 8
miles



NEW HAMPSHIRE**PROJECTED POPULATION CHANGE, 1970-1990****KEY**

NEW HAMPSHIRE PROJECTED LAND USE

KEY



Urban areas



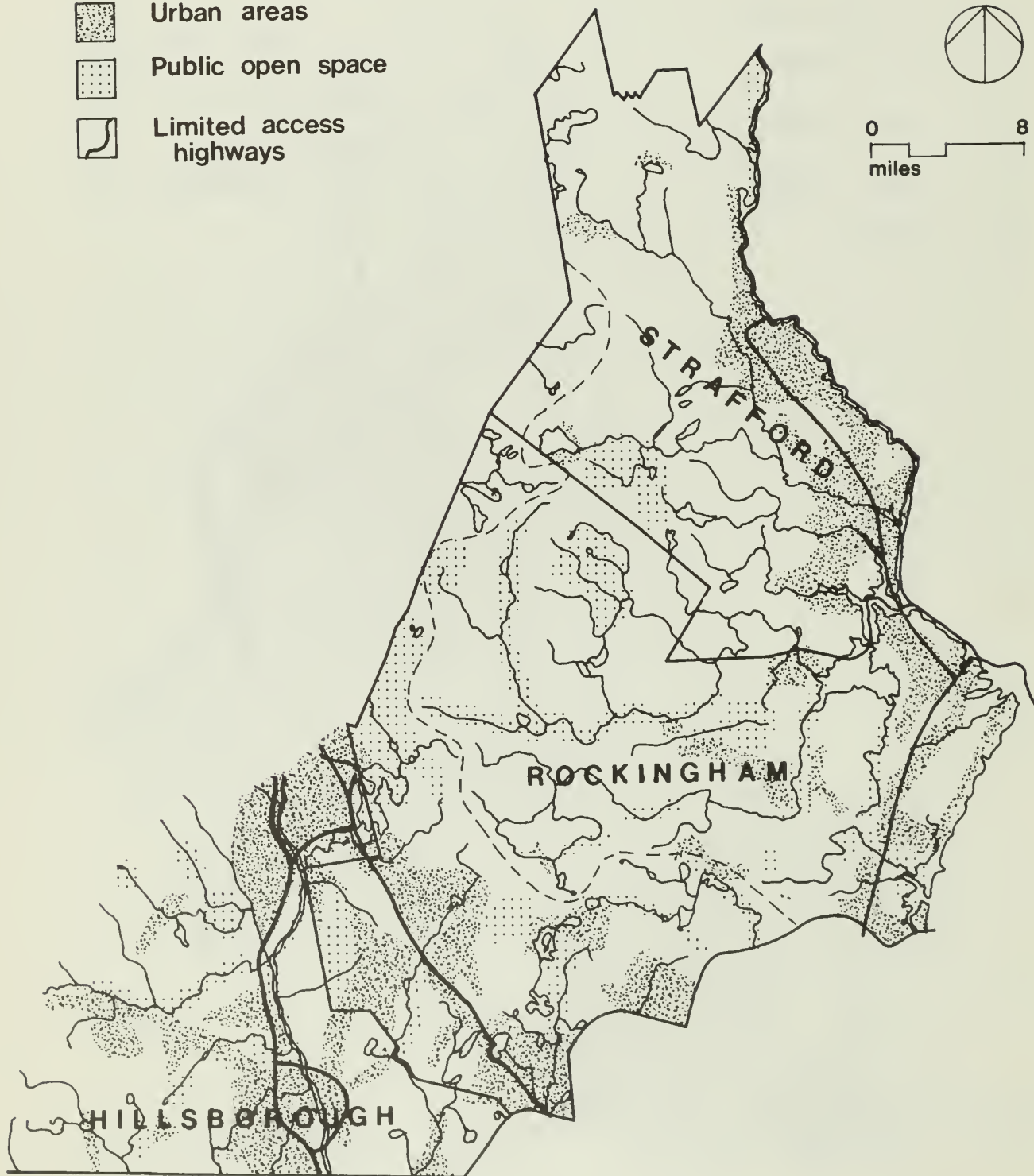
Public open space



Limited access
highways



0 8
miles



evident in the Massachusetts stretch of the Merrimack, while urban use along the Piscataqua and Salmon Falls is paralleled by similar but less extensive use across the river in Maine. Limited access highways link the western portion—Hillsborough and western Rockingham counties—with the Boston area while I-95 improves accessibility along the coast. Much of the easily developable land east of I-95 has been utilized, either for commercial or recreation-oriented urban uses such as cottages. Most of the public open space in this part of New Hampshire is also along the coast, but extensive wetlands throughout the area are not yet protected from development.

Considerable population growth is expected in the area south of Manchester, primarily because of the combination of pleasant environment, available land, and relatively good accessibility to employment opportunities in the Boston metropolitan area and the Merrimack Valley via limited access highways (Map 20). Dover, Durham, and Rochester also anticipate considerable growth, apparently based on past trends and potentially increasing employment opportunities provided by the University of New Hampshire at Durham and proposed industrial development, including a large generating facility in Rochester.

Corridors of urban development are expected in southeastern New Hampshire, reflecting expansion of present urban patterns (Map 21). Urban areas south of Manchester will coalesce into two arms of primarily residential development along the Merrimack to Nashua and along I-93 through Londonderry and Derry to Salem. Good accessibility in this area to employment opportunities is likely to spawn additional links of urban development between the two arms along other major highways, including a proposed circumferential around Nashua. The corridor between I-95 and the coast will also fill in, but if wetlands are protected from development, considerable open space will remain in this area. Much of this corridor will remain recreational and commercial in character, except for the industrial development anticipated in the Seabrook area. From Portsmouth up the Piscataqua and Salmon Falls Rivers; with an offshoot to Durham,

a fourth corridor of urbanization is likely to develop, linked together by the Spaulding Turnpike. Finally one narrow corridor of urbanization is anticipated linking the smaller centers of Exeter, Brentwood, and Epping along Route 101.

In addition to an increase in scattered park facilities to meet the needs of a rapidly expanding population and the expansion of public open space on coastal and inland shorelines, planners in southeastern New Hampshire advocate functional open spaces designed to help preserve the quality of the environment. Such open spaces included coastal and interior wetlands, floodplains of many of the rivers, and scenic easements along the streams and major transportation routes.

The State of New Hampshire exercises some control over potential development by controlling dredging and filling in tidal areas and public waters to protect marine fisheries, wildlife, and water quality. In addition, a new Commission has been established to evaluate all proposals for power plants and energy facilities. The regional planning commissions (5 in southeastern New Hampshire) are advisory bodies, operating under contract with the towns in their region and attempting to coordinate town efforts at planning. Since towns control the zoning power, and enforce their zoning policy with varying degrees of effectiveness, the attitude of the townspeople toward future development is crucial. In addition, the towns control the provision of public services such as water and sewers, and can exercise considerable control over development with careful planning of these services. Tremendous population growth in southeastern New Hampshire is alerting the people to the need for planning, but as of now the type of land-use planning (e.g. for conservation of the environment or wholesale economic development) is dependent on the town's attitudes.

Federal

The record of legislative protection for archaeological resources in New England has been dismal, at both the federal and state levels. In the past eight years, however, federal legislation has clearly established an enlightened public policy of prehistoric resource conservation. When implemented, the new legislation will provide guidelines for the first effective steps toward resource definition and management in the public interest.

The principle of protection for archaeological sites on federal land was first expressed in the Antiquities Act of 1906. The concept was expanded in the Historic Sites Act of 1935. These laws had little if any effect in protecting archaeological sites in New England. Federal landholdings in the region have been mainly military and administrative facilities. No inventory of archaeological sites on these properties was prepared and no provisions were made to protect them from destruction during the establishment, expansion, use, or retirement of such facilities. Military bases, including coastal forts, airports, and rocket launching sites have damaged or destroyed many archaeological sites in the survey region.

The more recent legislation should eventually provide effective protection on federal lands. Provisions of the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, Executive Order 11593, and the Archaeological and Historic Preservation Act of 1974 require the identification of sites on federal lands and the development of conservation policies in respect to them. To date the new regulations have had little effect, in part because of the widespread ignorance about New England's prehistory. Listing of sites on the National Register of Historic Places should ultimately broaden public

awareness of and concern for prehistoric cultural resources, affording a measure of indirect protection to sites which are not listed.

Among the more important provisions of the recent legislation has been the expansion of protective concern from federally-owned land to federally-assisted projects of many kinds. Provisions for archaeological salvage in advance of highway and reservoir construction formerly had no effect in New England, where they have not been enforced. In the past, federally-assisted urban renewal projects and construction of transportation facilities for land, sea, and air took a heavy toll of New England's archaeological sites. The requirement for assessment of project impact on cultural resources, established by the National Historic Preservation Act and the National Environmental Policy Act, cannot be so easily ignored or circumvented. These requirements were emphasized and clarified by Executive Order 11593 of 1971, and their importance for public policy was firmly established. The Archaeological and Historic Preservation Act of 1974, providing for survey and salvage of sites threatened by a wide range of federally-assisted projects, established the seriousness of the federal commitment to the preservation of prehistoric data. The expansion of National Register protection to archaeological sites, the requirement for impact assessment and alternative planning to conserve sites, and provision for professional investigation of sites which will be destroyed, are all major new tools for enlightened management of cultural resources.

States

For effective implementation of the federal guidelines, the cooperation and support of state governments is essential. At the state level, historic preservation plans must be devised, Na-

tional Register nominations made, state archaeologists appointed and financed at a professional level, statewide site surveys and inventories developed, and some state protection extended to sites. The Federal Government offers significant inducements to state and municipal agencies to encourage compliance with preservation goals. The National Park Service offers grants-in-aid in support of State Historic Preservation Plans. The grants may be used for survey, planning, acquisition and/or development in conjunction with an approved state plan. Another major source of planning funds is the Department of Housing and Urban Development's Comprehensive Planning grant program (Title IV, Section 701) which can be used to support historic resource planning and preservation in urban areas. The New England states have been slow to take advantage of these funds, and have used little or none in behalf of prehistoric resources. This oversight directly reflects the absence of professional archaeologists from the staffs and review boards of the State Historic Preservation Officers. With no spokesmen among the policy makers, archaeological resources have no effective claim to the protection offered by the Federal Government through state agencies. A review of the institutions of the three states represented in this survey indicates that each state has taken a different route toward compliance with the national laws, and that all have a long way to go.

Maine Maine has two relatively new institutions which provide a basis for archaeological resource management in the state. The Maine State Museum holds title to "archaeological artifacts and natural science specimens" found on or beneath state-owned land or water bodies, and has the responsibility for "protecting, preserving, and interpreting such objects. . . ." The legislation includes a provision to the effect that disturbance of such materials should occur only under permit from the State Museum, and the permit may specify in detail the methods of excavation to be used (Chapter 13 of Title 27 of Revised Statutes, "State-Owned Objects and Specimens"). However, as passed, the law permits disturbance of archaeological sites on state land with the

permission and at the discretion of the agency controlling the land. Hopefully, by modification of the existing working of the law or by cooperative interpretation of it, consultation with Museum archaeologists will regularly precede any disturbance of state-owned sites. The Museum staff includes an archaeologist who had responsibility, through the Museum facilities, for public education in prehistory, and for original research.

The State Register of Critical Areas, established in 1974 (Chapter 312 of Title 5 of Revised Statutes) will be an inventory of "areas of unusual natural, scenic, scientific, or historical interest," under the administration of the Critical Areas Advisory Board consisting of eleven appointed members. The Board will advise and assist the State Planning Office in respect to properties on the Register. Listed properties are protected to the extent that landowners must notify the state 60 days in advance of any proposed alteration. In the event of threat to a critical area, the State Planning Office may recommend state acquisition of the property, or contract with the landowner for "management agreements." The State Register of Critical Areas is of great interest as a way of extending site protection over lands in private ownership, a major problem in the Northeast.

Maine has no uniform resource management policies in respect to archaeological sites, even those on state land. The State Planning Office may consult informally with archaeologists but is not required to do so, and there have been no guidelines established to regularize either policies or procedures. There is a clear need for guidelines incorporating professional archaeological perspectives. In addition to state landholdings on which sites occur, and sites under water bodies, the state controls development of all lands within 250 feet of a water body, precisely those areas where archaeological sites are most likely to be. Administrative duties related to prehistoric resources are certain to expand under pressure of federal programs and legislation; the state must soon make explicit provision for a position of State Archaeologist. A bill to establish an archaeological survey failed to win legislative approval in 1974; it, or an equivalent measure, may be successful on another attempt.

The survey is a necessary preliminary to definition of conservation policies and priorities.

Massachusetts Massachusetts was the second New England state to establish an office of State Archaeologist, doing so in 1971. The office is appointive, within the State Historic Commission, but is neither staffed nor financed by the state. The Massachusetts Archaeological Society, Inc. provides space and limited facilities for the state archaeologist as a public service. It clearly is not required to do so, and cannot be expected to finance the expansion of services which is critically needed. Unfunded, the state archaeologist is currently unable to meet his statutory responsibilities in respect to the establishment and maintenance of a site survey, the formulation of site preservation plans, the dissemination of information about endangered sites, review of environmental impact reports, and coordination of contract survey and salvage work.

In 1973, the state enacted a law, "The Preservation of Historical and Archaeological Resources of the Commonwealth" (General Laws, Chapter 9). This act specifies the duties of the state archaeologist, establishes a requirement for permits in advance of survey and excavation done on state land or for state-licensed projects, and establishes a procedure for certification of archaeological "landmarks." Sites so certified cannot be excavated without permit. The state reserves title to all artifacts excavated under permit. The act further reserves from sale any public lands with archaeological resources on them, but makes no provision for long-term conservation of the resources. Easements on private lands may be arranged for "study and salvage" but, again, no incentives are offered for preservation. No funds were provided to implement any provisions of this act.

In the same year, a Board of Underwater Archaeological Resources was established, under Chapter 6 of the General Laws, to "encourage the discovery and reporting of and to protect and preserve historical, scientific, and archaeological information... within the inland and coastal waters of the commonwealth." Title to such resources is reserved to the state, and a permit is to be obtained for any disturbance or investigation of the sites. There is a further

provision which exempts from protection "previously discovered and commonly known underwater archaeological resources," and the Board is directed to publish a list of exempt sites. This bill also is unfunded, and to date (11/74) the Board has not been appointed.

The Office of the Secretary of Environmental Affairs is empowered by the state's Environmental Protection Act (G.L. Chapter 30, Sections 61, 62) to require an Environmental Impact Report in advance of projects utilizing state funds or licenses. Impacts upon cultural resources are to be considered in the reports, which undergo a review at the state level similar to the federal EIS review process. These provisions will provide some protection for archaeological sites once the state landmarks program is firmly established and the archaeological survey is activated.

The state legislation in respect to archaeological sites lacks an explicit commitment to a policy of site preservation, but it does include provisions which could be used to further such a policy. Conservation and preservation restrictions on land use are defined in Chapter 184 (Sections 31-33) of the General Laws, where use of preservation restrictions on behalf of archaeological sites is anticipated. Section 31 provides that such a restriction can "forbid or limit... change in appearance or condition of the site, ... field investigations without a permit, and other acts or uses detrimental to appropriate preservation of the ... site." Such restrictions could be used to protect, for public purposes, sites on private land. Preservation restrictions in conjunction with historic landmark status would appear to offer the best protection feasible for sites on private land.

New Hampshire New Hampshire's recently established State Historic Preservation Office (July 1974, Chapter 227-C) has an ambitious mandate, which includes the responsibility to "develop an on-going program of historical, architectural and archaeological research and development to include continuing surveys, excavations, scientific recording, interpretation and publication..." No funds were provided to support this program for the fiscal year ending June 30, 1975. The State Historic Preservation Office is part of the De-

partment of Resources and Economic Development, and is the only state agency charged with responsibility for cultural resource planning. There is as yet no provision for a state archaeologist.

New Hampshire lacks comprehensive land-use legislation, and has only piecemeal regulations for assessment of environmental impacts. The State Office of Comprehensive Planning is currently developing state-wide policy and legislation for environmental protection.

One creative piece of legislation which could conceivably provide some protection for archaeological sites is the Current Use Taxation Bill of 1973 (Chapter 79-A). This law provides for special low tax rates on "open space land," to encourage holding for such use. Several categories of open space land are defined; of special interest here is "wild land" which includes "a tract of unimproved land of any size, suitable to its purpose, being left in its natural state without interference with the ecological process and containing or supporting rare and unusual natural phenomena, the preservation of which is in the public interest and such preservation requires substantial limitation of public access. . ." (Schedule of Criteria and Values, Current Use Advisory Board VI A.2.). New Hampshire also permits tax abatements on qualified historic sites in conjunction with preservation easements. The extension of such protection to archaeological sites is being

considered. To date, this legislation has not been implemented in such a manner that effective archaeological conservation has resulted.

Discussion

The New England state governments have moved very slowly in response to their federally defined responsibilities for historic preservation. The federal legislation cannot be effective until the states supply administrative support services and funds for planning, development, and preservation (Table 6). Part of the delay can be understood as incongruities between expectations and assets; the financial confidence of the late 1960's has already been betrayed by the unforeseen realities of the present. However, some of the reluctance to move toward effective preservation programs, as far as archaeological sites are concerned, is based on misunderstanding and ignorance, leading to false economies and wasteful neglect of a unique heritage.

Because archaeological excavation is a labor-intensive activity, it is necessarily an expensive undertaking. Therefore, site conservation should take precedence over site salvage whenever possible. Much of the state legislation drafted for archaeology, and most of the policies now in effect in New England, consider only salvage as impact mitigation, with little or no explicit concern for site protection and

TABLE 6
Comparison of Resource Management Legislation

Provisions	Maine	Massachusetts	New Hampshire	Federal
State archaeologist	—	x	—	—
Site survey	—	x	x	S
Site register	x	x	x	S
Preservation policies	S	x	x	S
Preservation legislation	x	x	—	S
State museum	S	—	—	—
Research responsibility	S	x	x	S
Research program	S	—	—	S
Review procedures for impact mitigation	S	S	—	S
Salvage provision	x	—	—	S
Title to artifacts on public land	x	x	—	x
Control of excavation on public land	x	x	—	x
Underwater sites protected	x	x	—	—
Permit provision	x	x	—	x

x—Provided by law
S—Also supported with funds

preservation. The result is crisis-oriented policies which are expensive, short-sighted, and wasteful of both money and resources.

The several states, separately or together, need to formulate policies which will provide effective, long-term protection to significant portions of their prehistoric resources. The resources need to be defined and evaluated so that informed decisions can be made about their future use. Management policies should involve choices among such alternatives as 1) complete or 2) partial research excavation, 3) emergency salvage, 4) preservation in public or private hands, and even 5) extended "dead" storage for research in the future, when fresh research problems and better methods will be available.

Definition and evaluation of resources and the formulation of conservation policies will require the efforts of trained personnel working with a professional level of support. At the minimum, this means a funded state archaeologist with staff support. None of the three states reviewed here has such an office.

The current status of state plans for archaeological preservation reflects the absence of professional archaeologists on the planning boards. It is all too easy for non-archaeologists to ignore resources whose scope and meaning they are unable to assess. Only Maine and Massachusetts reserve to the state title artifacts found on state land. This minimal protective provision is lacking in New Hampshire. Massachusetts' Historic Landmarks register, and Maine's Critical Areas register have provisions for extending some state protection over important sites on private land; New Hampshire's tax laws might conceivably have some effect in that direction. Massachusetts' law specifically protecting underwater sites still remains to be implemented, a year after its passage. These existing laws cannot be effectively administered in the absence of professional evaluation of sites and long-range preservation guidelines.

Public funds are not available for site inventories in any of the three states. Massachusetts and New Hampshire laws express state responsibility for site inventories, but in the absence of funding the laws are of no immediate use. Maine alone provides, some re-

search and custodial facilities as part of its historic preservation establishment; it is the only state of the three with a state museum. Maine is also unique in the degree to which it has been able to utilize federal Historic Preservation Grants-in-Aid. Of the three states considered here, Maine is the only one which has received its total allocation under the program in the years 1969-1974. Both Massachusetts and New Hampshire have failed to utilize major sums offered during those years. The federal regulations for matching the Preservation Grant funds are generous. Initiative and imagination could expand the amount of money available for archaeological preservation even without further direct appropriation by the states.

The New England states so far have chosen to provide for historic preservation in distinctive ways, fitting the programs into existing governmental structures for administrative convenience. There still seems to be opportunity for regional cooperation and moves toward comprehensive, compatible resource planning. The prehistoric sites of one state are highly relevant to the understanding of others across the boundary. Preservation plans and policies would be stronger with a regional orientation, and might even be more easily formulated at that scale. Program administration in the several states will obviously differ; the long-range goals and the policies to achieve them need not be distinct.

At the other end of the administrative scale, state planners must find the means to involve local planning agencies in programs of site conservation. This will require extensive education. Far too many local historical and conservation agencies view those archaeological sites which come to their attentions as resources to be immediately exploited for publicity or as curio sites to be exposed. Since archaeological sites are parts of cultural systems adapted to specific environments, watersheds are ideal spatial units for site conservation planning. Both Maine and Massachusetts have land-use planning boards which are defined at least partially by watersheds. With education and informed direction, such agencies could function well in the administration of site protection programs.

Chapters Two and Three summarize evidence for the scope, complexity, and significance of regional archaeological resources. It is obvious that the survey area has supported human populations for eleven to thirteen thousand years. The great diversity of New England's environmental zones, which makes the region unusually attractive for human habitation and use today, required an almost equally great diversity of human adaptive responses in the past. The expectation is that an expanded knowledge of New England's prehistory will expose a great complexity of cultural forms and of historical events through both time and space. This rich record of human life will be of immediate interest to present residents and visitors to the area, as well as to anthropologists and historians.

The data from which this human past can be reconstructed are being reduced every day, at an accelerating rate. The congruence of aboriginal and historical residential and exploitative requirements has meant that many archaeological sites, and most of the major ones, were destroyed long ago. Natural erosive forces have taken a heavy toll, especially of the older sites. Nevertheless, the 777 sites recorded for this survey amount to about half the number expected. A target figure of 1500 was initially defined on the basis of the investigator's knowledge of eastern Massachusetts conditions. In fact, it appears that figure may have been unrealistically low. To cite only one instance, in Maine, archaeological survey north and east of the region under consideration here has produced a much higher site density along waterways than this survey was able to demonstrate. A target figure for knowable sites in the survey region can be approximated by using Essex county, Massa-

chusetts, as a microcosm of the whole. Essex is a reasonable choice, being centrally located and containing within its borders all of the major environmental zones of the region—estuaries, rocky coastlines, broad floodplains, and irregularly dissected uplands of moderate relief. The density for Essex county, .55 sites per square mile, can be projected to the entire survey region of roughly 4000 square miles, to indicate a total of 2200 sites which might reasonably be expected to be identifiable, in the late twentieth century. We have no sound basis for estimating, at present, what actual proportion of those expectable sites retains any research potential (Table 3). Unless survey effort is mobilized immediately, we will never know.

Future development and landscape modification in the region will adversely affect much of what little remains from the originally large number of aboriginal sites. The concentrations of archaeological sites upon soils favored now for residential, commercial, and industrial uses is shown on Tables 1 and 2. Within the endangered areas highlighted on Map 9, these high-potential zones should be immediately identified and surveyed, so that extant archaeological resources can be inventoried and preserved or, at the very least, carefully investigated before they are further damaged. It should be obvious, considering past and present rates of site destruction and the incipient state of knowledge about New England's prehistory, that any site research potential deserves conservation as a scarce resource with significant public value.

Resource Management Policies

The anticipated further growth of New England's population and industry makes cer-

tain the continuing destruction of archaeological sites (Chapter Four). However, it is not necessary that public benefits, in the form of increased understanding of the human conditions, be sacrificed entirely to present or future physical needs. The rate and direction of site loss can be controlled by rational policies of resource management, and must be so controlled in the public interest.

Effective management of a scarce resource must be based firmly upon a policy of resource conservation. In this case, the sharp reduction of the rate of resource destruction is the only realistic goal of a public program for archaeology. Obviously, salvage programs are totally inadequate to achieve this end, and will always be so. Salvage is a legitimate last-ditch tactic, not a policy of choice. Administrators, legislators, professional archaeologists, and an enlightened public must mobilize in support of a policy which maximizes site conservation.

State Historic Preservation Officers are in the best position to develop and implement policies for site conservation. They are responsible for developing an effective and comprehensive plan for historic preservation in which archaeological sites are an essential concern. Each State Historic Preservation Officer should avail himself of archaeological counsel and expertise in planning for site protection. Archaeologist with recognized professional competence should be on the state historic preservation review boards, where they can evaluate the effectiveness of preservation planning. Professional state archaeologists, with competence in preservation planning and administration, are essential to the success of any state program. The Historic Preservation Officers, as the local administrators of federal planning and preservation grants, can raise the funding priorities of archaeological survey and preservation planning programs, so that the several states can move beyond good intentions toward solid achievement.

Survey A rational conservation policy will stress site protection for the retention of future research data, in combination with carefully defined guidelines to aid in deciding which sites must be sacrificed and how their research potential is to be determined in advance of de-

struction. At the present time, the information available about New England's sites is inadequate to the task of formulating criteria on which such management decisions could be soundly based. Because of this need, the collection of survey data throughout the region must be given the highest priority in all state programs for cultural resource planning. Professional archaeologists with regional experience must be involved in planning the surveys, defining the basic data requirements, and in formulating the criteria upon which preservation decisions will be based.

It has been characteristic of natural conservation and historic preservation planners in New England to underestimate seriously the scope of archaeological resources, the difficulty of assembling the necessary information, the need of confidentiality with site locations, and the public value of archaeological information. They have frequently attempted to gather such information on their own initiative, through casual inquiries or the distribution of generalized questionnaires. They are typically bewildered by the reluctance of archaeologists to open their files, or by archaeologists' inability to provide detailed, exhaustive site inventories upon request. The frequency of such requests testifies amply to the serious need for centralized, state-supported, professionally staffed archaeological surveys.

Preservation and Protection All of the states have some legislation which can be employed in support of state-administered programs of site preservation (Chapter Five). In most cases, a variety of means is available already, needing only explicit policy formulation and professionally-guided administration to become effective. Maine and Massachusetts are in the best positions to begin site protection by using their "Critical Areas" and "Archaeological Landmarks" registers. They can support those measures by the incorporation of site protection policies into their programs for public open space and wetlands acquisition and management and by the use of easements and restrictions provided by law. Policy guidelines are needed immediately to protect sites on public land. In Maine and Massachusetts the intention of such protection has been legisla-

tively expressed, but not yet effectively administered. It is necessary to be explicit about preservation policies for sites on public land, because of the variety of potentially conflicting uses of the land. Buildings should not be erected on sites, nor trees planted, nor heavy vehicles or equipment marshalled or stored. Sites should not be identified precisely by signs or maps unless fully adequate protection against vandalism is provided. There should be provision for a stringent review procedure before excavation permits are granted, and none should be granted purely for purposes of "training" students or other personnel.

Effective site conservation also requires limitations on access to survey data. The locations of sites with research potential should not be publicized beyond the needs for site protection. There are enough precedents in the restrictions normally applied on information about the locations of endangered species' breeding and nesting grounds. Archaeological sites need more seclusion, since they do not reproduce. Any spurious claims about the public's "right to know" must be encountered by the necessity for the data's continued existence.

Policy Implementation

Essential to any effective state program for archaeological resource conservation is knowledge about the resource among the people responsible for designing and administering the program. The weakness of the several state programs reviewed in Chapter Five derive in large measure from the fact that there was little involvement in the legislative planning by professional archaeologists, as well as from the fact that public knowledge and awareness of archaeological resources in New England is extraordinarily low. Good state programs must overcome these difficulties at two levels; expertise must be actively recruited to help formulate and administer the programs; and the programs must include provisions for greatly expanded public education in archaeology and public involvement in site conservation.

Archaeological site inventories will be effective management tools only to the extent that the data incorporated in them are 1) accu-

rate, 2) relevant, 3) current and 4) representative of the total range of the resources to be managed. A good site survey is, therefore, one which is planned to provide such data. This requires the compilation of information about site locations, sizes, cultural contents, types (villages, hunting camps, quarries, cemeteries, etc.), ecological relationships, and research potential. The specification and standardization of survey data require the skills of a trained archaeologist; no state survey can succeed without competence at this level. The mobilization and training of field workers to collect the data can be accomplished in a variety of ways, utilizing some combination of mature professionals, students, and volunteers. A centralized state office for site survey is in a good position to coordinate the work of publicly and privately supported researchers, volunteers, and contract surveys and salvage work.

Because of the diversity among the states in regard to the legislative and administrative structure for land conservation, the agencies ultimately acquiring and/or administering preserved sites will be different in each state. Preservation restrictions may be held by a number of different agencies or institutions, as may scientific or conservation easements. Publicly acquired lands may be under the control of several distinct commissions, departments, or trusts. In all cases, there should be a coordinating office with the responsibility for standardizing management policies for archaeological sites; a professional archaeologist, usually the State Archaeologist, should be in control.

The same office should have a voice in reviewing major land development projects at an early stage of planning. State requirements to this effect modeled on the federal precedents of National Environmental Protection Act and the National Historic Preservation Act are strongly recommended. Archaeology is still often slighted in the review process at the state level, even for projects with federal involvement. This occurs because no effective, full-time officer has clear responsibility for such reviews, nor the staff necessary to process them.

While an effective State Archaeologist is a necessary first step in building a program of archaeological conservation, professional expertise is needed in other offices also, at reg-

ional and local levels of planning and administration. The small size of administrative units in New England makes cooperation and coordination across administrative boundaries imperative. While state archaeologists can effect such coordination in their own routines, they cannot be expected to do so at all levels of government. For example, the New England River Basins Commission, major state landholding or development agencies, and watershed and metropolitan area planning councils could all benefit from the availability of archaeological counsel, in the form of staff positions in some cases, regularly available consultants in others.

Supportive Programs and Facilities

There is great potential for beneficial programs in publicly-supported archaeology which go beyond the establishment of effective resource management policies, into education and research. Public interest in educational programs in archaeology is considerably larger than the facilities now available to serve it. The small local archaeological museums and exhibits scattered about the six states receive more use and attention than their size and content typically justify. Archaeological subjects attract high viewer interest on television. School programs in archaeology, although poorly designed with respect to local prehistory, receive enthusiastic response. The few aboriginal sites identified for the benefit of visitors, typically cemeteries and forts of the seventeenth century, attract both residents and tourists, in spite of the paucity of interpretive information available about them. Publicly supported programs of research and education could serve this large audience, and encourage its growth. The result would be enlightened public support for conservation policies and an enriched appreciation of local heritage.

Research programs can be encouraged in several ways. The state archaeologist's responsibility for research coordination could be expanded to include direct research capability, as long as the necessary staff and space could be provided. Active research programs can be developed on state campuses; in some cases they already exist. Centralized coordination of sal-

vage excavations can be of great help in increasing their contributions to a state-wide research program. Where state museums exist or can be established, they can play a significant role in research as well as in education.

The highest priorities for public education in archaeology must be given to programs designed to support site conservation policies. Education departments must receive help in designing for school use, constructive programs which can raise levels of awareness and appreciation of local resources without encouraging destructive excavation. A wider audience can be reached through television and newspaper information campaigns; these must be carefully designed to channel enthusiasm in positive directions. Audiences which already possess special interests and skills can be reached through programs directed toward conservation groups and historical and archaeological societies. Such groups can especially effective, once recruited, in locally-administered site protection programs. A publication program for dissemination of information to a large general audience would be highly beneficial. In cases where state agencies are directly involved in research, specialist publication opportunities must be provided to make research results available.

State museums with active educational commitments are highly desirable adjuncts of public programs for archaeology. They can be unusually effective in communicating research results to a broad public, through such means as in-house or traveling exhibits, popular and specialist publications, television shows and speaker services. Museums are also the best facilities for long-term custody of archaeological materials, providing maximal security and continuing responsible storage and preservation.

Conclusion

In order to prevent the final destruction of their prehistoric heritage, the New England states must take strong conservation measures. Existing laws in each of the three states considered here provide some useful mechanisms for those purposes; they need to be implemented constructively, and supplemented in

some cases. All New England states should establish channels for regional coordination of archaeological conservation programs, so that watersheds, tidewater zones, and other natural units can be administered conformably. This goal might be approached through expansion of the responsibilities of the New England River Basins Commission. The states must play a more active role in encouraging scientifically sound research, especially in the crucial areas which will be subject to increasing urbanization.

None of the states has availed itself effectively of federal funds for survey and planning; this neglect should be rectified rapidly, so that data collection and policy formulation can begin. In order to take advantage of federal help and to initiate essential conservation programs, the several states must expand their financial support for the relevant administrative offices and data-gathering programs. Much more could be done with federal grants-in-aid than the states have attempted so far; money now available to support these necessary programs is not being used. In some cases, notably New Hampshire (Table 6), additional legislation is needed to create an adequate legal and administrative base for a conservation program. In all of the states there is a great need for both formal and informal programs of public education. Conservation programs can succeed only when they are solidly supported by an informed and appreciative public. Public involvement in site protection, at the level of towns and landowners, is the best, and perhaps the only realistic, hope for effective conservation.

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Maine

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Massachusetts

Regional Planning Commissions

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LIPE, WILLIAM D.

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MCGIMSEY, CHARLES R.

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B1. Slope and Drainage Characteristics of Site Locations

The classification used here and on Tables 1 and 2 has been formulated to express the characteristics of site locations in terms indicative of their potential for destructive development. Accordingly, factors of slope and drainage have been combined, and ranked according

to their desirability for residential and industrial development, from A (most desirable) to G (least desirable). Additional categories H (beaches or dunes) and X (unknown) have been added to encompass the universe represented by the site data.

In the most recent county soil surveys, the Soil Conservation Service has classified each soil type according to the degree of limitation

TABLE 7
Description of Soil Categories

Category	Slope Characteristics	Drainage Characteristics	Other Relevant Characteristics
A	less than 8%	good or excessive	—
B	less than 8%	good, or minor problems	possibly stony
C	8% to 15%	good, or minor problems	—
D	greater than 15%	good or excessive	—
E	less than 15%	poor, subject to flooding	—
F	greater than 15%	poor	possibly bedrock near surface
G	less than 15%	—	bedrock near surface
H			coastal beach or dunes
X		unknown	site location imprecise or no soil survey

(slight, moderate, severe) it offers for constructing permanent homesites and septic tanks. Their classification provided the nucleus for the categories used in this study, although their emphasis on suitability for septic tanks was not given so much weight as other limitations for homesite construction, since a substantial proportion of future urban developments will be included in sewer systems.

Although most of the counties in the study area have not been surveyed recently, it was not difficult to extrapolate backwards to the less detailed studies of the 1920's and 1930's, because the Soil Conservation Service's descriptions of degree and kind of limitations for construction were based primarily on drainage characteristics and slope, taking into account bedrock surfaces and very stony areas.

B2. Interpretation of Soil Categories for Archaeology

Tables 1 and 2 indicate the frequencies with which archaeological sites are situated on the several categories of soil. The strong preference for soil category A is expressed wherever soils of that class are available, notably in Middlesex and Norfolk counties, Massachusetts. Stonier (B) or moderately sloping (C) soils with good drainage account for all but a few special cases of site locations. The erratic distribution of sites on sloping C soils appears to represent coding errors or mapping errors; field experience indicates that sites rarely lie on slopes as steep as 10–15%, but they may extend onto them from adjacent, more level ground.

In river valleys, periodically flooded soils (E) were occupied for special purposes or in low-water seasons. Such locations are of special interest to the archaeologist because of the high probability of alluvial stratification there. The Merrimack Valley in Massachusetts and New Hampshire should have many more stratified sites on the floodplain than have been reported in the literature. The high frequency of flooded sites in the Piscataqua drainage of coastal New Hampshire and Maine includes a number of sites near or below modern high tide levels. The absence of sites on E soils in coastal Cumberland, Suffolk, and Plymouth

counties reflects only deficiencies in the available records.

Category G, with bedrock near the surface, increases in frequency toward the north; this appears to reflect the absolutely higher frequencies of such soils in coastal Maine, rather than an expression of cultural preference. The low frequencies of sites on beach or dune is expectable; given the fragility of such topography, sites located there would not remain intact long enough to be recognized.

Appendix C Directories

C1. Where to Report Sites, Inquire about Site Preservation

Maine

Dr. Bruce J. Bourque
Maine State Museum
Augusta 04330

Professor David Sanger
Department of Anthropology
University of Maine
Orono 04473

Professor Stephen Perlman
Department of Geography and
Anthropology
University of Maine
Gorham 04038

Massachusetts

Dr. Maurice Robbins
State Archaeologist
Bronson Museum
8 North Main Street
Attleboro 02703

Professor Dena F. Dincauze
Department of Anthropology
University of Massachusetts
Amherst 01002

Professor Barbara Luedtke
Department of Anthropology,
College II
University of Massachusetts
Boston 02125

New Hampshire

Historic Preservation Office
Department of Resources and

Economic Development
Concord 03301

Professor Charles Bolian
Department of Sociology and
Anthropology
University of New Hampshire
Durham 03824

C2. State Historic Preservation Officers

Maine

Mr. James H. Mundy, Director
Maine Historic Preservation
Commission
31 Western Avenue
Augusta 04330

Massachusetts

Secretary of the Commonwealth
Chairman, Massachusetts Historical
Commission
40 Beacon Street
Boston 02108

Staff Designee:

Mrs. Elizabeth Amadon,
Executive Director
Massachusetts Historical
Commission
40 Beacon Street
Boston 02108

New Hampshire

Mr. George Gilman, Commissioner
Department of Resources and
Economic Development
P.O. Box 856
Concord 03301



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

